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ONTARIO GEOLOGICAL SURVEY

Open File Report 6008

Report of Activities, 1999
Resident Geologist Program

Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre

by

P.J. Sangster, W.J. McGuinty, V.C. Papertzian, K.G. Steele, C.R. Lee, D.A. Laidlaw and T.R. Carter

2000

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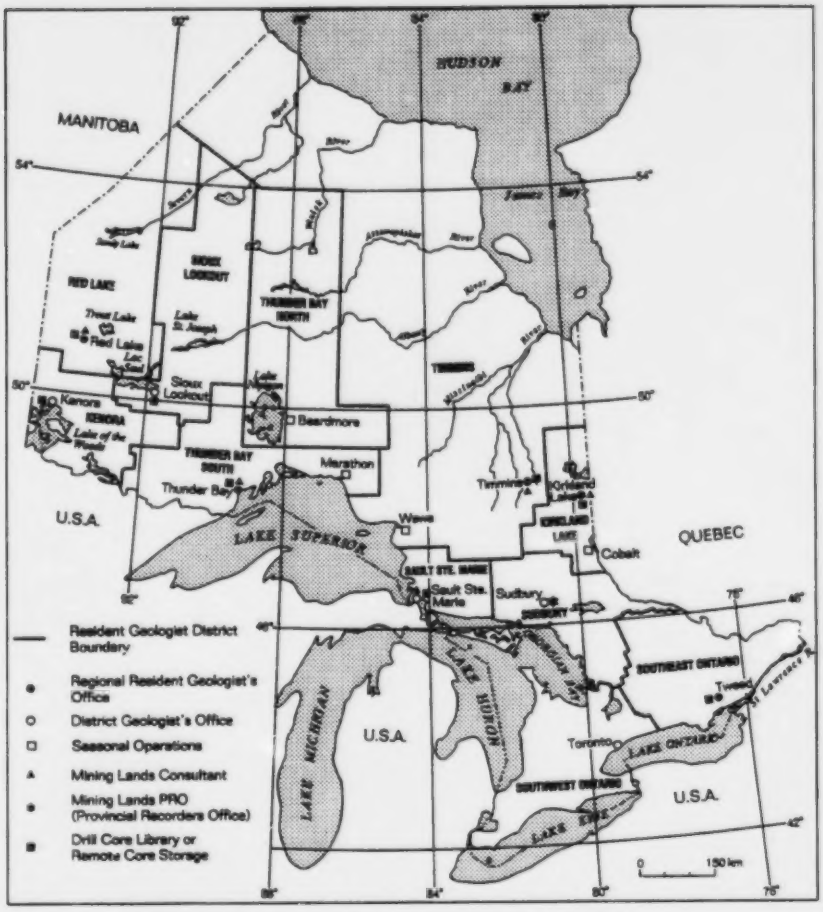

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES–1999

SOUTHERN ONTARIO REGIONAL RESIDENT GEOLOGIST REPORT

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Southeast Ontario District)–1999

by

P.J. Sangster, V.C. Papertzian and D.A. Laidlaw

2000

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SOUTHERN ONTARIO REGIONAL RESIDENT GEOLOGIST (SOUTHEAST ONTARIO DISTRICT)–1999

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INTRODUCTION

In 1999 the District saw continued production from mines and quarry operations both in the Grenville Province and in the Palaeozoic rocks to the south and to the east. OMYA Canada Inc. completed the fourth year of a five-year plant expansion program near Perth. Junior mining companies, independent prospectors and one major mining company completed exploration programs in the area. The search for gold, base metals and industrial minerals dominated exploration activity. The evaluation of potential dimension stone deposits also maintained a high profile in the area.

Twenty-one prospectors received funding under the Ontario Prospectors Assistance Program (OPAP) totalling $315,000. Commodities sought included gold, platinum, zinc, hematite, vermiculite, feldspar and dimension stone. One prospector was forced to re-locate his project to another District following the withdrawal of his original proposal area from staking under the Ontario Living Legacy initiative. All other grant recipients reported successful field seasons.

MINING ACTIVITY

During 1999 there were 35 mining operations in southeastern Ontario including: 1 metal mine; 5 industrial mineral operations; 2 trap rock producers; 2 cement producer's quarries; 1 brick producer's quarry; 3 gemstone and mineral specimen quarries; 21 dimension and decorative stone producers and 1 producer of magnetite as a heavy aggregate for use in nuclear shielding. For a complete listing of Mining/Quarrying Activity and locations of operating mines, quarries and mills in southeastern Ontario, please refer to Table 1 and Figure 1 respectively.

Essroc Canada Inc. - Picton Quarry

Essroc Canada Inc., a division of the Italcementi Group of Companies, operates the Picton quarry and cement plant located on the west shore of Picton Bay, 4 km northeast of Picton in Lots 13 to 18, Concession I, Sophiasburg Township.

The original plant built in 1958 has had several expansions and modernizations, the latest being a kiln upgrade. Within the next two years the kiln will be modified so that scrap tires can be added to the firing process in order to reduce both present sulphur emissions and fuel costs.

The producing north quarry exposes limestone of the Ordovician Black River and Trenton Groups. The south quarry, which is connected to the north quarry by a tunnel, is now being used to recirculate water that in the past had

been pumped from Picton Bay. An on-site geodesic storage dome can hold 100,000 tons of clinker. Cement is transported by the Great Lakes vessel, Stephen B. Roman from an on-site port to Toronto, Windsor, New York and Cleveland during the shipping season. Production for 1999 was just under 1 Mt of cement (Essroc Canada Inc., personal communication, Dec., 1999).

Highwood Resources Ltd. - Canada Talc

Highwood Resources Ltd., of Calgary Alberta purchased Canada Talc in January of 1999. The Canada Talc, Henderson Mine located near Madoc as well as processing facilities in the nearby community of Marmora, bring to Highwood diversification of sales into talc and dolomite products and existing infrastructure which is much closer to the company's existing filler market. Highwood has invested considerable time and capital expenditure into the upgrading and expansion facilities at both the mine and the processing plant.

Specifically, additional ore access has been attained by the development of a new mining level (underground) at the Madoc Mine which will allow for the planned increase in production to over 20, 000 tonnes per year. Similarly, the completed upgrading and expansion of processing lines at the Marmora Processing Plant has allowed for the increased volume of ground and micronized talc and dolomite products as well as the processing of other mineral filler products, mainly barite (H. Miree, Highwood Resources Ltd., written communication, Jan, 2000).

Table 1. Mining/Quarrying Activity in 1999 – Southeast Ontario District (Keyed to Figure 1).

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining/Quarrying Activity
1	3 M Canada Inc. (Havelock Quarry)	Belmont (Trap Rock)	Roofing Granules and HL-1 aggregate used in the production of premium asphalt mixes for Ontario highways, concrete, anti-skid treatment, bridge decks, railway ballast, asphalt shingles and rolled roofing.
2	Allan Franks Construction Ltd.	Madoc (Limestone)	Limestone has been quarried and crushed since 1991 for use as road aggregate.
3	Aqua Rose Quarries	Lyndoch (Gem Minerals)	Quarrying operations for rose quartz, beryl, feldspar, lyndochite, amazonite, cleavlandite, peristerite, columbite, fluorite, bertrandite. Two quarries are operational: the Beryl Pit which operates on a fee for collecting basis and the Rose Quartz Quarry which produces mineral specimens and landscape stone. A total of 40 tons of stone was sold from both quarries in 1999.
4	Arriscraft Corporation (Elgin Quarry)	Bastard (Sandstone)	Potsdam sandstone is quarried for the manufacture of reconstituted sandstone. Raw material is shipped to Cambridge for processing. In 1998, a new application was found with blocks being quarried and cut into tiles for use in lining acid tanks.
5	Belmont Rose Granite Corp. (Belmont Rose Granite Quarry)	Belmont (Dimension Stone)	Granite is quarried for dimension stone, curb stone and landscaping purposes
6	Canada Talc Ltd., A Division of Highwood Resources Ltd. (Henderson Mine)	Huntingdon (Talc, Dolomite)	(*see* "Mining Activity")
7	Central Ontario Natural Stone (Batty Quarry)	Laxton (Limestone)	Grey, buff and black limestone are produced as flagstone.
8	Central Ontario Natural Stone (Oxtongue Lake Quarry)	McClintock (Stone)	Pink and grey granite gneiss is quarried for flagstone, building stone, and landscaping stone.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining/Quarrying Activity
9	Cornwall Gravel Company Ltd. (Cornwall Quarry)	Cornwall (Limestone)	Rough blocks of black limestone are produced on demand for dimension stone from the thick, upper beds of an aggregate quarry.
10	Danford Construction (Springbrook Road Quarry)	Huntingdon (Limestone)	Limestone is quarried and crushed for road aggregate (seasonal operation)
11	Essroc Canada Inc. (Picton Quarry)	Sophiasburg (Cement)	One of the largest cement plants in North America with an on-site limestone quarry. In 1999 cement production was just under 1 million tons.
12	Granimar Quarries Ltd.	Rear of Leeds and Lansdowne (Granite)	Rideau Red granite blocks are quarried for use as dimension stone
13	I.K.O. Industries Ltd. (I.K.O. Quarry)	Madoc (Trap Rock)	Trap rock is quarried for roofing granules and HL-1 aggregate. An onsite mill and colouring plant have been in operation since 1998.
14	International Quartz Ltd.	McClintock (Quartz)	Decorative and crushed white quartz and terrazzo.
15	Jannock Ltd. (Canada Brick) (Russell Quarry	Russell, Gloucester (Clay Products)	Clay brick is produced from red shale. The quarry is located in Russell Twp. while the plant is located in Gloucester Twp.
16	The Kingston Red Granite Co. Ltd. (Seeley's Bay Quarry #1 & Seeley's Bay Quarry #2)	Rear of Leeds and Landsdowne (Granite)	Red granite is quarried for armour stone, landscaping, architectural and structural stone from both quarries.
17	LaFarge Canada Inc. (Bath Quarry)	Ernestown (Cement)	Lafarge operates a cement plant with an on-site limestone quarry. Production in 1998 was 1.1 million tonnes of clinker and 920,000 tonnes of cement. Silica used in the production of cement is quarried from a Potsdam sandstone quarry in Pittsburgh Twp. and from recycled foundry sands.
18	St. Lawrence Cement Inc. (Colborne Quarry)	Cramahe (Limestone, Cement)	In 1999, 1 987 516 Mt of limestone was extracted from the quarry.
19	Nelson Windover Quarries (Windover, Buckhorn Quarry)	Harvey (Limestone)	A seasonal operation that quarries grey limestone for flagstone.
20	OMYA (Canada) Inc. (Tatlock Quarry)	Darling (Calcite/marble)	Operations are located in Perth. Calcitic marble is quarried to produce hydrocarb and Snowhite Calcium powder, a high purity, fine-grind calcite for fillers plus terrazzo chips and landscaping stone as secondary products. Production is 250 000 tons per year. The quarry, which opened in 1977 employs 48 people and has reserves of over 5M tons. In 1999, the fourth year of a five-year expansion program was completed.
21	Payne, E.W. (Payne Quarry)	Dummer (Limestone)	Flagstone is produced seasonally from this quarry. In 1999, 1 500 t were quarried.
22	Princess Sodalite Mine	Dungannon (Gemstones)	Rehabilitation of the site continues under new ownership. Samples of sodalite were available for sale.
23	Redstone Quarries	Harvey (Limestone)	Red and green marble as well as grey limestone are quarried for flagstone, landscaping stone and armour stone. They also have a landscaping division.
24	Rideauview Contractors Ltd. (Sloan Quarry, Battersea Quarry)	Storrington (Sandstone, Granite)	Cream and red sandstone are produced as ashlar, flagstone and landscaping stone at the Sloan Quarry. Red granite is quarried from the Battersea Quarry.

SOUTHEAST ONTARIO DISTRICT - 1999

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining/Quarrying Activity
25	Rideauview Contractors Ltd. (Rideauview Quarry)	Storrington (Sandstone)	Red sandstone is produced for ashlar and flagstone.
26	Rideauview Contractors Ltd. (Pettworth & Renaud Quarries)	Camden (Limestone)	Limestone is quarried and used for restoration work in Kingston.
27	Rideauview Contractors Ltd. (Ellisville Quarry)	Rear Leeds & Lansdowne (Sandstone)	Sandstone is produced for landscaping material and limestone from the Pettworth Quarry is processed here.
28	Specialty Aggregate Corporation	Madoc (Marble)	Red, pink, white, green, buff, black, blue, chocolate, light buff and light green marble are mined from 8 quarries in the Madoc area. Marble chips (terrazzo), exposed aggregate and landscape stone are produced at the mill.
29	Timminco Ltd. (Timminco Metals Quarry)	Ross (Magnesium, Strontium & Calcium metal)	Magnesium is produced from high-purity dolomite quarried at this location. Calcium and strontium are produced from purchased limestone. Production rate is 1000 tons of dolomite weekly. The annual production is 6 000 tons of magnesium metal and alloys; 400 tons of calcium metal and alloys and 135 tons of strontium metal. The operation employs 240 people and there are reserves for 50 years at the current rates of production.
30	Specialty Aggregate Corporation (Tomclid Mine)	South Canonto (Magnetite as Heavy Aggregate)	Production began in late 1997. Magnetite was quarried and crushed on site for use as heavy aggregate in nuclear shielding. In 1999 shipments came from stockpiled material.
31	TRT Aggregates Ltd.	Ameliasburgh, Hilliard, Tyendinaga, Thurlow & Richmond (Limestone)	Rough dimension stone blocks, armour stone, flagstone and crushed limestone are produced. Most of the quarries are operated on an on-demand basis.
32	Unimin Canada Ltd. (Blue Mountain Quarry)	Methuen (Nepheline Syenite)	Nepheline syenite is quarried and processed in two mills. Magnetite is produced as a bi-product. Production rate is 2 500 tons/day. The mine opened in 1955 and employs 152 people.
33	Upper Canada Stone Co. Ltd. (Mayo Quarry)	Mayo (Dolomitic Marble)	White marble is quarried and sold as crushed marble, landscaping stone, decorative stone and in pre-cast architectural concrete and panels.
34	North Hastings Aggregate Ltd.	Dungannon (Decorative Aggregate)	Multicoloured granite is extracted for use as decorative aggregate. 15 000 tons were shipped in 1999.
35	Drain Construction	Dummer (Limestone)	Limestone for use as road aggregate.

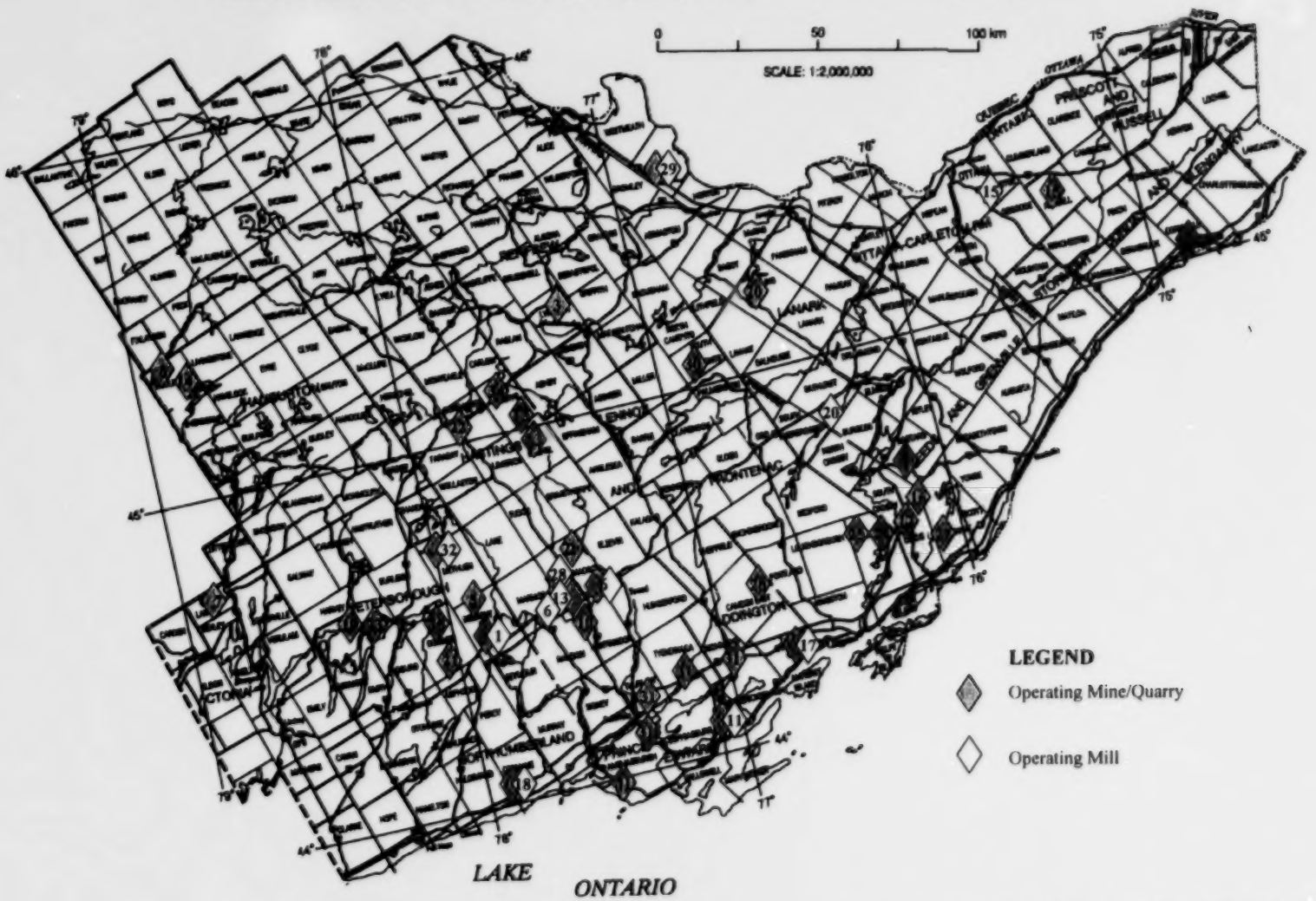


Figure 1: Mining/Quarrying Activity in 1999 - Southeast District, Southern Ontario Regional Resident Geologist Region

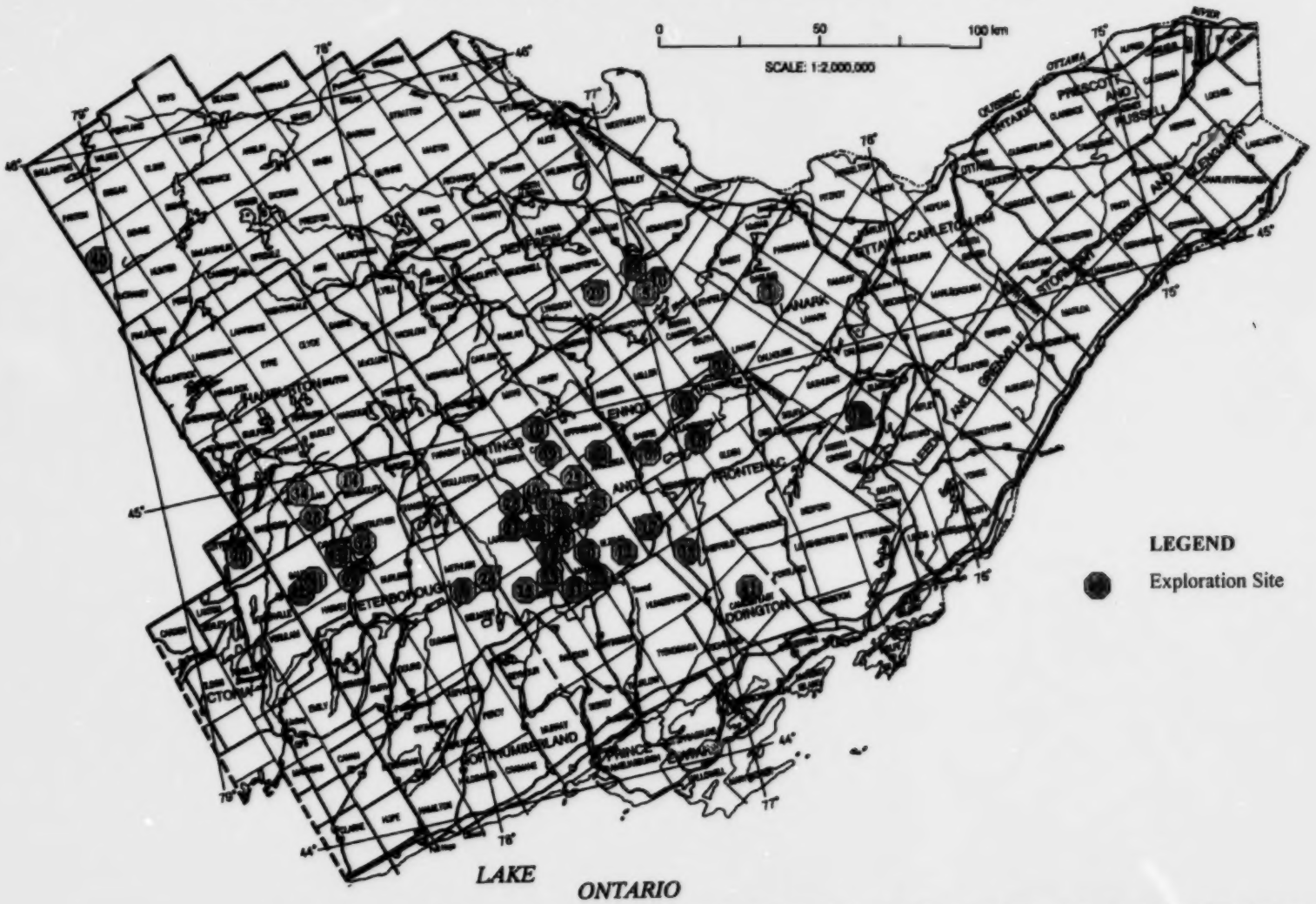


Figure 2: Exploration Activity in 1999 - Southeast District, Southern Ontario Regional Resident Geologist Region

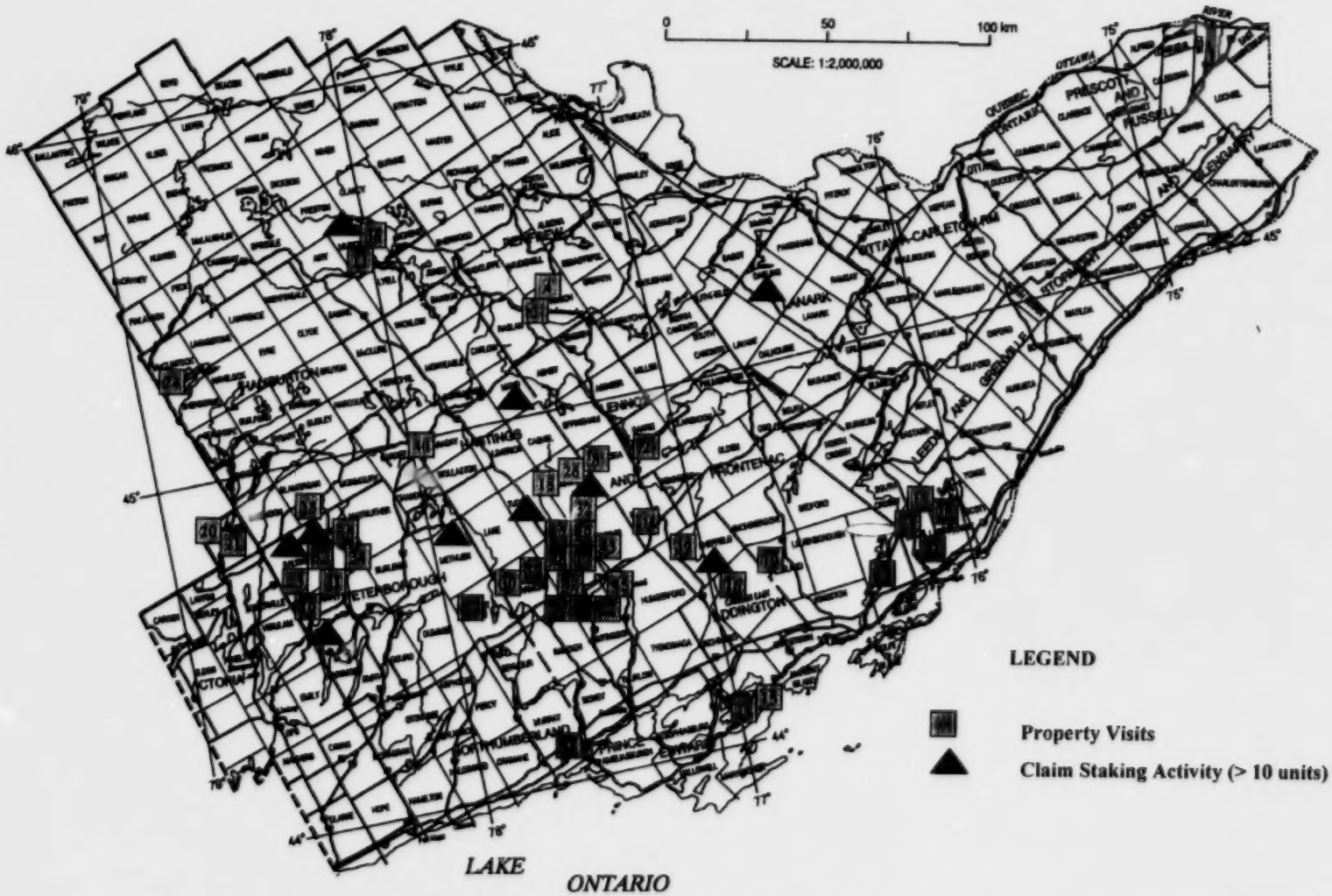


Figure 3: Property Visits and Claim Staking Activity in 1999 - Southeast District, Southern Ontario Regional Resident Geologist Region

ADVANCED EXPLORATION

Regis Resources

A summary of previous work on the Regis Resources Cavendish Township vermiculite deposit is given in the Report of Activities, 1998, Southern Ontario Regional Resident Geologist Report: Southeast District.

Exploration in the area during 1999 outlined additional zones of vermiculite that have subsequently been staked. Stripping, trenching and sampling were completed to extend the mineralized zone. The company successfully recovered commercial grade vermiculite using a field based exfoliation plant and mini-winnower process. Feedback from potential buyers has been positive. The company further reports that the vermiculite is suitable for horticultural applications, contrary to previously published information that resulted from improper testing methods. The property is now fully permitted under the Aggregate Resources Act. A feasibility study has been started and will be completed in early 2000 (M. Shefski, personal communication, Jan., 2000; P. Sangster, personal observations, Jun., 1999).

Diamond Lake Minerals

Diamond Lake Minerals continued evaluation of their graphite deposit in Bedford Township. Work conducted during the year included diamond drilling, trenching, sampling and analyses. A complete summary of recent work on the deposit is given in the Report of Activities, 1998, Southern Ontario Regional Resident Geologist Report: Southeast District (D.Houston, personal communication, Jan., 2000).

Bulk Sample Permits

Although only 16 non-metallic minerals are designated under the Mining Act, the process of taking bulk samples of minerals administered under the Aggregate Resources Act in certain circumstances may also fall under the Mining Act. Bulk samples of aggregate, crushed stone, dimension stone and other industrial minerals allow the developer to test product quality, markets and suitability for proposed applications. In 1999, bulk sample permits were issued for: the Royel Paving granite prospect in Galway Township; the Ingram Wessel limestone prospect in Laxton Township; the Mervin Johnson limestone prospect in Galway Township and the Senator Stone dimension stone prospect in Sheffield Township.

Table 2. Summary of Claims Recorded and Assessment Work Submitted in 1999 – Southeast Ontario District.

Year	Claims Units Recorded	Claim Units Cancelled	Claims Units Active	Diamond Drilling ($)	Physical Work ($)	Geotechnical Work* ($)	Total ($)
1999	545		1 538				
1998	269		1 588				
1997	201	249	N/A	N/A	N/A	N/A	N/A
1996	748	251	1 304	19 767	99 434	212 178	331 379
1995	301	346	807	44 185	31 554	86 368	162 107
1994	229	417	852	763 545	115 052	135 168	1 013 765
1993	153	277	1 040	-	8 399	125 853	134 252

** As of 1992, Geological and Geophysical Survey data are combined as Geotechnical Work*

EXPLORATION ACTIVITY

Highwood Resources Ltd.

Highwood Resources Ltd. continues to seek mineral prospects, particularly those, which may compliment its existing mineral filler business. One such prospect, optioned during 1999, was the Kaladar Mica Prospect (also known formerly as the Kozumi Property), jointly owned by Roger Young of Havelock and Robert Guillet of Lakefield. The prospect is located 5km southwest of the community of Kaladar, in Kaladar Township. The company completed line cutting, geological mapping, mineral processing testwork and market research on the muscovite mica resources during 1999. Additional processing testwork and diamond drilling are planned for the project during 2000 (H. Miree, Highwood Resources Ltd., written communication, Jan, 2000).

R. V. Stewart - Ruby Garnet Property

The R. V. Stewart Ruby Garnet Property is located on Lot 3, Concession XV in Ashby Township, approximately 40 km east of Bancroft. The almandine garnet deposit is hosted by garnetiferous paragneisses of the Bancroft Terrane. The property was originally staked in 1910 for J.H. Jewell and Company who sank a shaft the following year proximal to the later-developed Ruby Quarry. Work continued on the property from 1922 to 1924, during which time 1 600 tons of garnet ore and concentrates for use in sandpaper manufacturing were produced and shipped to the Carborundum Company of Niagara Falls, N.Y.

During the 1970's, Labrador Mining and Exploration Co. Limited bulk sampled the deposit for use as an abrasive in the manufacture of sandpaper. The garnet sample met or exceeded the sandpaper hardness criteria, however, the rounded edges of individual grains were not deemed suitable for the production of sandpaper (C.C. Allen, Assessment Report, 2.1489).

In 1990, R. Stewart staked the property. In 1991, he mapped and sampled the garnet-bearing outcrops. Preliminary quality testing of the garnets returned encouraging results (R. Stewart, Published Assessment Report, 2.14604). During 1999, a detailed evaluation in the vicinity of the Ruby Quarry was completed to determine the deposit's grade and possible tonnage within potential quarry cuts. Calculations indicate 314 000 t with an average, minimum grade of 30% garnet from the East Zone and 404 666 t with a grade ranging from 15% to 23% in the West Zone. All reserve calculations represent a "first quarry cut" over an average thickness of approximately 10 m below the present surface rock exposures (R. Stewart, Assessment Report, 2.19884).

Mr. Stewart indicated that the garnet would be suitable as an abrasive in water jet cutting. (R. Stewart, personal communication, Jan., 2000). At pressures up to 25 000 psi, 1 to 10 kg/minute of garnet entrained in the water stream, acts as the cutting tool. This application is a relatively new but rapidly growing method of cutting materials such as metals, concrete, glass and cloth (Harben 1996).

Noranda Mining and Exploration Inc.

Diamond drilling planned for 1999 in Bagot Township on a new zinc showing discovered by Noranda Mining and Exploration Inc. in 1998 was not completed as a result of low zinc prices. Although the claims will be maintained in good standing, further exploration of the property is not planned for 2000 (G. Rogers, Noranda Mining and Exploration Inc., personal communication, Jan., 2000).

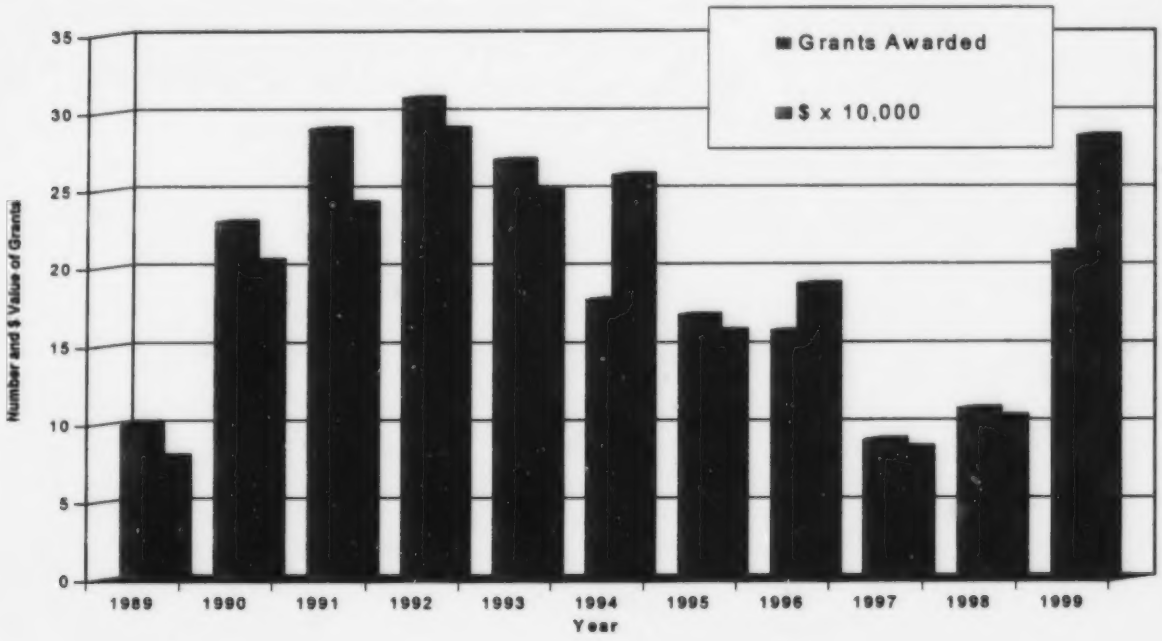
Phelps Dodge Corporation of Canada Ltd.

In 1999, Phelps Dodge Corporation of Canada Ltd. recorded a number of claims in Madoc Township covering

documented mineral occurrences including the past producing Eldorado copper mine. The company diamond drilled one hole on the Brennan iron occurrence in central Madoc Township. Additional exploration in the area is planned for 2000 (Phelps Dodge, personal communication June 1999, December 1999).

Ontario Prospectors Assistance Program (OPAP)

Table 3. Ontario Prospectors Assistance Program 1989-1999 – Southeast Ontario District.



From 1989 to the final year of the Ontario Prospectors Assistance Program (OPAP) in 1999, over $2M was awarded to prospectors in the Southeast District, Southern Ontario Regional Resident Geologist Region. OPAP provided partial funding for an exploration program in South Canonto Township which ultimately led to the opening of the Tomclid iron mine, a producer of magnetite for use as heavy aggregate in nuclear shielding. In Cavendish Township, OPAP funding was used in the early exploration of vermiculite prospects that are currently under development. Numerous prospectors have successfully optioned gold and base metal projects to mining companies based on work completed under OPAP. The dollar value for OPAP grants awarded in 1999 has been estimated at $285 000.

Table 4. Exploration Activity in 1999– Southeast Ontario District.

Abbreviations

AEM	Airborne electromagnetic survey
AM	Airborne magnetic survey
ARA	Airborne radiometric survey
Beep	Beep Mat survey
Bulk	Bulk sampling
DD	Diamond drilling
DDH	Diamond drill hole(s)
DGP	Down-hole geophysics
GC	Geochemical survey
GEM	Ground electromagnetic survey
GL	Geological Survey
GM	Ground magnetic survey
GRA	Ground radiometric survey
Grav	Gravity survey
HLEM	Horizontal loop electromagnetic survey
HM	Heavy mineral sampling
IM	Industrial mineral testing and marketing
IP	Induced polarization survey
Lc	Line cutting
Met	Metallurgical testing
OD	Overburden drilling
ODH	Overburden drill hole(s)
OMIP	Ontario Mineral Incentive Program
OPAP	Ontario Prospectors Assistance Program
PEM	Pulse electromagnetic survey
PGM	Platinum group metals
Pr	Prospecting
RES	Resistivity survey
Samp	Sampling (other than bulk)
Seismic	Seismic survey
SP	Self-potential survey
Str	Stripping
Tr	Trenching
UG	Underground exploration/development
VLEM	Vertical loop electromagnetic survey
VLFEM	Very low frequency electromagnetic survey

No.	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Adams, John	Darling (Au)	OPAP, Pr, GL, GP, Samp, DD
2	Archibald, Alan A.	Galway (Vermiculite)	OPAP, Pr, Str, GC
3	Archibald, Fred T.	Cavendish (Vermiculite)	OPAP, GL, GC, Samp
4	Archibald, John C.	Galway (Vermiculite)	OPAP, Pr, Str, GL, GP
5	Ash, Duncan	Brougham (IM)	OPAP, GL, DD, CL
6	Banner, Albert	Barrie (Au, Ag)	OPAP, Str, GL, Samp
7	Beesley, Timothy	Anglesea (Au, Base Metals)	OPAP, GL, GC, Samp
8	Brown, W.	Methuen (Stone)	Pr
9	Chard, James M.	Tudor (Au)	OPAP, DD, CL, Samp
10	Coltas, Peter C.	Brougham (IM)	OPAP, GL, DD, Cl, Samp
11	Dillman, Robert	Tudor (Au)	OPAP, DD, CL, Samp
12	Dupres, J.	Elzevir (Soapstone)	Pr, Samp
13	E-Minerals Exploration Corp.	Clarendon (Base Metals)	Samp, Till GC
14	Fouts, Chris	Monmouth (Mineral specimens)	OPAP, Pr, GL, GP, Str
15	Gallo, Ernest	Marmora, Madoc, Clarendon (Dimension stone)	OPAP, Pr, GL, Samp, DD

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No.	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
16	Graphite Mountain Inc.	North Burgess (Graphite)	Tr
17	Highwood Resources	Kaladar (Muscovite)	Lc, Geol, IM
18	Hodgson, Rand	Tudor (Au)	OPAP, GC, GP
19	Holmstead, Wayne	Cashel (Base Metals, Au)	OPAP, GL, GC, GP, Str, Samp
20	Ingram Wessell	Lutterworth (Stone)	Bulk
21	King, Brian R.	Tudor (Zn)	OPAP, DD, CL, Samp
22	Kirkman, R.	Grimsthorpe (Stone)	Drilling
23	Kresz, David	Grimsthorpe (Dim. Stone)	OPAP, GL, Samp
24	Kretschmar, U.	Methuen, Belmont (Silica, Marble)	GMAG
25	Laidlaw, Jim	Grimsthorpe (Au-PGM)	OPAP, GP, GC
26	Lashbrook, R.	Tudor, Cavendish, Glamorgan (Stone)	Pr
27	Lydia Diamond	Tudor (Diamond)	Drilling
28	Marek, David	Palmerston (IM)	OPAP, Str, Samp, GL
29	Metzger, H.	Griffith (Marble)	Physical
30	Phelps Dodge	Madoc (Base Metals)	DD, Geol
31	Reed, Alan A.	Madoc (IM)	GM, GRA
32	Regis Resources Inc.	Cavendish (Vermiculite)	Pr
33	Ross, Robert J.	Marmora (Au, Ag)	OPAP, Lc, GP, GL, Samp, GC
34	Royel Paving Ltd.	Glamorgan (Aggregate)	Bulk
35	Senator Stone	Sheffield (Stone)	IM
36	Stewart, Ralph V.	Brougham (Graphite)	OPAP, GL, Samp, GP
37	Thompson, Lloyd	Madoc (IM)	OPAP, Lc, GP, GL, Samp
38	Tulonen, Paul V.G.	Tudor (Zn)	OPAP, DD, CL, Samp
39	Upper Canada Stone Company Ltd.	Cashel (Marble)	Str, GL
40	Vinecrest Management Services	Butt (Graphite)	GL
41	Wilson, M.	Camden East (Soapstone)	Samp

LAND USE PLANNING ACTIVITY

Ontario's Living Legacy

In February 1997 the Ontario Government initiated the Lands for Life planning program to provide land use and resource management direction for Crown lands and resources in an area covering 45% of Ontario. The planning process involved a series of planning phases with extensive public consultation.

On March 29, 1999 the Proposed Land Use Strategy was announced by the Premier of Ontario and released for public comment. Revisions were made to the document as a result of comments received, primarily to clarify topics and to refine selected boundaries for the areas identified for protection. The final, approved Land Use Strategy, released in July 1999, recommended the establishment of 378 new provincial parks, park additions and conservation reserves in Ontario.

MNR and MNDM staff worked together in May 1999 to protect the heritage values related to the recommended 378 sites prior to their final regulation by withdrawing these areas from staking for mineral exploration.

The Ministry of Natural Resources has begun the process of finalizing the boundaries for regulating the 378 identified sites. A public review of the first 64 sites was conducted between November 15 and December 15, 1999. The next step in the process will be the formal establishment (by regulation) of these 64 sites as provincial parks or conservation reserves in 2000.

As of December 31, 1999, 12 sites within the Southeast District have been scheduled for regulation as parks or conservation reserves in 2000 (Ontario's Living Legacy Land Use Planning Strategy www.mnr.gov.on.ca).

Municipal Planning

Through the Ministry of Northern Development and Mines commitment to mineral-related Provincial Policy Statements contained within the Planning Act, the Resident Geologist Program staff provide comment and input into the development of municipal Official Plans and Official Plan Amendments through the Ministry of Municipal Affairs and Housing's one-window approach.

In 1999, Tweed Resident Geologist Program staff reviewed Official Plans and Official Plan Amendments for the following municipalities: Merrickville, Elizabethtown Township, Ernestown Township, North Grenville Township, the town of Cobourg, Prescott-Russell Township, North Fredericksburgh Township, the regional municipality of Pine Ridge, Kennebec Township, Olden Township, Hinchinbrooke Township, Oso Township, Bathurst Township, Burgess Township, South Sherbrooke Township, Stone Mills, Wolfe Island and West Carleton Township.

In conjunction with R. Debicki, MNDM Land Use Policy and Planning Coordinator, Sudbury, the Regional Resident Geologist developed and presented a training session that outlined MNDM planning interests to municipal planners in Toronto, Kingston and London. The ongoing amalgamation of many townships and municipalities has created a need for Program staff to revise mineral resource planning documents that identify MNDM areas of planning interest.

RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

During 1999, staff of the Southeast District, Southern Ontario Regional Resident Geologist Office included: P.J. Sangster, Regional Resident Geologist; V.C. Papertzian, Southeast District Geologist and D. A. Laidlaw, Southeast District Support Geologist. J. Neuman and J. Fabian provided field season support under the Summer Experience Program. Geological Consultant C. R. Ware was hired on a contract basis to work exclusively on upgrading the Mineral Deposit Inventory database.

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Over 7500 Mineral Deposit Inventory (MDI) records currently exist for the Southeast District, Southern Ontario Regional Resident Geologist Region. Extensive time in 1999 has been devoted to upgrading the MDI database as well as adding data from recent fieldwork to the database. Over 1 550 MDI files have been processed by all staff and MDI contractor, Celia Ware. A recurring problem with the existing database has been the inclusion of records that do not meet the minimum criteria for inclusion in the database. Since the project began in September 1999, 232 such records have been deleted. The examination MDI records for 48 townships from Abinger to Camden, and, Ross through Sheffield townships has been completed.

In conjunction with Resident Geologist Program staff from the Southwest District Office, a display highlighting "Mining In Southern Ontario, A Billion Dollar Business" was presented at the annual Prospectors and Developers Association of Canada convention in Toronto. The display was later modified and presented at the Northeastern Ontario Mines and Minerals Symposium in Timmins and the Northwestern Ontario Mines and Minerals Symposium in Thunder Bay. In September, additional modifications were made and staff presented "Geology and Mineral Resources in Southern Ontario" at the International Plowing Match in Dashwood. A brochure, "Mining In Southern Ontario, A Billion Dollar Business", was produced and distributed at various venues throughout 1999.

In 1998, a project designed to rehabilitate the offsite drill core storage compound and upgrade the drill core library indexing system was initiated. In 1999, the drill core library computer index was first converted to PC format and then to an Access database. The deterioration of exposed wooden drill core boxes and storage pallets is a perennial problem at the offsite, diamond drill core compound. During the summer and fall of 1999, 50 pallet roofs were constructed from galvanized steel roofing and fixed in place. Diamond drill core from 5 pallets was moved from the Tweed drill core library to core rack storage at the offsite facility. In addition, diamond drill core stored on a number of wooden pallets was re-stacked onto new steel pallets.

In 1999, Resident Geologist Program staff from the Tweed office conducted 45 field investigations/client property visits throughout the Southeast District. In addition, the Regional Resident Geologist visited 7 sites in the Southwest District. For a complete listing of property visits please refer to Table 5.

During the course of the year 35 industry reports were processed and added to the Tweed office assessment file library. For details please refer to Table 6 this report. Table 7 provides a summary of office activity and Table 8 lists additions made to the Tweed technical library during 1999.

Table 5. Property Visits Completed in 1999 – Southeast Ontario District (Keyed to Figure 3.)

	Property	Commodity		Property	Commodity
1.	Addington gold mine	Gold, kimberlite	24.	F. Jones – International Quartz	Silica
2.	Albert Banner – Ore Chimney	Gold/Silver (OPAP)	25.	Kingston Red Granite	Dimension Stone
3.	Aqua Rose – Rose Quartz Quarry	Rose Quartz	26.	Laidlaw Property(OPAP)	Metals (OPAP)
4.	Aqua Rose – Beryl Pit	Mineral Specimens	27.	Madoc Mining	Hazard Inspection
5.	Bailey Fluorite	Hazard Inspection	28.	Madoc Township	Rhyolite outcrop
6.	Battersea Quarry	Dimension stone	29.	Madoc Township –pit	Hazard Inspection
7.	Belmont Rose Quarry	Granite	30.	Maloney minesite	Hazard Inspection
8.	Beesley Property	Metals (OPAP)	31	Mountain Lake	Granite
9.	Blakely Fluorite	Hazard Inspection	32.	Mt. Moriah	Syenite
10.	Buckhorn Quarry	Limestone	33.	Parnell Quarry	Limestone
11.	Cameron and Alec Quarry	Pegmatite	34.	Preston Quarry	Limestone
12.	Canada Slate Quarry	Slate	35.	Regis Resources Property	Vermiculite
13.	Ellisville Quarry	Sandstone	36.	A.Reid – Gole / Comet / Mohawk	Stone, Soil Conditioner
14.	Essroc Picton - Quarry & Plant	Limestone	37.	Bob Ross Property	Gold(OPAP)
15.	Essroc Picton – North Quarry	Kimberlite	38.	Royel Paving Property	Granite
16.	Gold Horn Mining – Varty Lake	Kimberlite	39.	Senator Stone Sheffield Quarry	Dimension Stone
17.	Granimar Quarry	Dimension Stone	40.	Silver Crater	Calcite
18.	Grenville Gold Property	Gold(OPAP)	41.	South Lake Syenite	False Hazard Inspection
19.	Holleford Meteorite Crater	Scientific Interest	42.	Stoklosar Quarry	Marble
20.	Ingram Wessell Quarry	Limestone	43.	Thompson Claims – Madoc	Iron
21.	Ingram Wessell Test Pit	Limestone – bulk sample	44.	Trenton	False Fossil Investigation
22.	Johnson Fluorite Mine Site	Hazard Inspection	45.	Tweed Marble Quarry	Dimension Stone
23.	Mervin Johnson -Claims	Limestone			

	Visits Outside District	Commodity		Visits Outside Region	Commodity
46.	Brampton Brick Hungry Hollow	Limestone, Shale, Fossils	52.	Craig Mine	Copper, Nickel
47.	Kettle Point	Scientific Interest	53.	Red Lake Area	Gold
48.	Pinery Provincial Park	Scientific Interest	54.	Tyndal Stone Quarry	Limestone
49.	Rock Glen	Fossil Collecting Locale			
50.	Sifto Salt – Evaporation Plant	Salt – Brine wells			
51.	Thedford Quarry	Limestone – Fossils			

Table 6. Assessment files received in the Southeast Ontario District in 1999.

Abbreviations

AEM ..... Airborne electromagnetic survey
AM ..... Airborne magnetic survey
ARA ..... Airborne radiometric survey
Beep ..... Beep Mat survey
Bulk ..... Bulk sampling
DD ..... Diamond drilling
DDH ..... Diamond drill hole(s)
DGP ..... Down-hole geophysics
GC ..... Geochemical survey
GEM ..... Ground electromagnetic survey
GL ..... Geological Survey
GM ..... Ground magnetic survey
GRA ..... Ground radiometric survey
Grav ..... Gravity survey
HLEM ..... Horizontal loop electromagnetic survey
HM ..... Heavy mineral sampling
IM ..... Industrial mineral testing and marketing
IP ..... Induced polarization survey
Lc ..... Linecutting
Met ..... Metallurgical testing
OD ..... Overburden drilling
ODH ..... Overburden drill hole(s)
OMIP ..... Ontario Mineral Incentive Program
OPAP ..... Ontario Prospectors Assistance Program
PEM ..... Pulse electromagnetic survey
PGM ..... Platinum group metals
Pr ..... Prospecting
RES ..... Resistivity survey
Samp ..... Sampling (other than bulk)
Seismic ..... Seismic survey
SP ..... Self-potential survey
Str ..... Stripping
Tr ..... Trenching
UG ..... Underground exploration/development
VLEM ..... Vertical loop electromagnetic survey
VLFEM ..... Very low frequency electromagnetic survey

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
1.	Ashby (Gt)	Stewart, R.V.	99	Lc, GL	2.19884	13
2.	Burleigh (Au)	Over, G./Edwards, B.	98	Pr	2.19603	22
3.	Butt (Graphite)	Vinecrest Management Services	99	GL	2.19644	2
4.	Cardiff (U)	Imperial Oil	75, 77	DD		226
5.	Cashel (Marble)	Upper Canada Stone Company Ltd.	99	Str, GL	2.19716	19
6.	Cashel (Talc, Soapstone)	Summers, D.	97	Lc, Pr, Str, GM	OP97-169	18
7.	Cavendish (Granite)	1045839 Ontario Limited	98	Lc, GL, GM	2.19052	109
8.	Cavendish (Granite, Au)	1045839 Ontario Limited	98	DD	2.19159	110
9.	Cavendish (Vermiculite)	Regis Resources Inc.	99	Pr	2.19824	111
10.	Faraday (Dim.St.)	Kellar, R.	97	Lc, Str, Samp, DD	OP97-140	86
11.	Galway (Limestone)	Jeff Parnell Contracting Ltd.	98	Lc, GL	2.19061	36

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
12.	Glamorgan (U)	Imperial Oil	75, 76	DD		30
13.	Glamorgan (Agg.)	Royel Paving Ltd.	98, 99	Bulk	2.19735	31
14.	Grimsthorpe (Au)	Beesley, T./Laidlaw, J.	98	GL	2.19373	66
15.	Grimsthorpe (Fe)	Canada Iron Mining Ltd.	51	GM	63.259	67
16.	Harvey (Cu, Fe)	Victoria Algoma Mineral Company Limited	67	GL		11
17.	Kaladar (Soapstone)	Kretschmar, U.	97	GL, IM	OP97-192	70
18.	Lavant (Au)	Gleeson, C.F./Rampton, V.N.	97	Samp, Pr, Tr, GC, DD	OP97-332, 091	56
19.	Lyndoch (Graphite)	Stewart, R.V.	98	GL, Lc, GEM, Samp	2.19570	38
20.	Madoc (IM)	Reed, A.A.	99	GM, GRA	2.19372	138
21.	Madoc (Trap)	IKO Industries Ltd.	98	DD	2.19561	139
22.	Marmora (Au)	Ross, R.J.	97, 98	Lc, DD, Samp, GM	2.19266	83
23.	Marmora (Au)	Ross, R.J.	97	GM, Str, Tr, DD, Samp	OP97-059	84
24.	Marmora (Au)	Chard, J.M.	97	Pr, Samp, GL, GC	OP97-256	85
25.	Monmouth (Mineral specimens)	Bancroft & District Chamber of Commerce	98	Tr	2.18994	142
26.	Monmouth (Mineral specimens)	Bancroft & District Chamber of Commerce	98	Tr	2.18985	143
27.	Monmouth (U)	Imperial Oil	74, 76, 77, 78	DD		144
28.	Monmouth (Mineral specimens)	Bancroft & District Chamber of Commerce	99	Tr, GL	2.19778	145
29.	Monmouth (Mineral specimens)	Bancroft & District Chamber of Commerce	99	Tr, GRA	2.19831	146
30.	North Burgess (Graphite)	Graphite Mountain Inc.	99	Tr	2.19699	17
31.	Tudor (Au)	Tulonen, P./King, B.	97	AEM, AM	2.18986	83
32.	Tudor (Au)	Dillman, R.J./Chard, J.	97	Lc, GEM, GL, Pr, Tr, Samp	2.19374	84

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Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
33. Tudor (Au)	Dillman, R.J.	98	GL, Lc, GC, Pr, Tr, Samp	2.19375	85
34. Tudor (Au)	Dillman, R.J.	97	Tr, GL, GC, GM, DD, Samp, GEM	OP97-170	86
35. Tudor (Au)	Tulonen, P.V.G./King, B.R.	97	Lc, AEM, AM, Pr, Str, Tr, Samp, DD	OP97-180, 179	87
36. Tudor (Diamonds)	Von Anhalt, E. & J.	97-99	Str, Tr, Samp	2.19269	88

Table 7. Statistics for 1999 – Southeast Ontario District

Activity	1998	1999
Field Investigations/Property Visits	34	45
MDI Records Revised	0	1550
Field Trips Given/Field Guide Written	2	4
OPAP Recipients	11	22
MMAH Presentations	4	3
Clients Visits to Tweed RGP Office	501	508
Drill Core Library Users	16	23
Client Communications/Interactions (Presentations/Poster Sessions)	N/A	2375
Client Inquiries (Telephone/E-mail/Mail)	2172	2079
OGS Publications Sold	112	73
Prospector's Licenses Sold	21	10
Claim/Line Tags Sold	197	408

Table 8. Library Acquisitions 1999 – Southeast Ontario District*

Title	Author	Type and Year of Publication
Trace Element Geochemistry of Volcanic Rocks: Applications for Massive Sulphide Exploration	Edited by Wyman, D.A.	GAC Short Course Notes Volume 12, 1996
Mid-Continent Diamonds	Edited by Dunne, K.P.E. and Grant, B.	GAC-MAC Symposium Volume, 1993
Alteration and Alteration Processes Associated with Ore-Forming Systems	Edited by Lentz, D.R.	GAC Short Course Notes Volume 11, 1994
Dimension Stones of the World	Marble Institute of America	Catalogue, 1990

* *For a listing of OGS publications acquired in 1999 see "Table 14".*

PROPERTY EXAMINATIONS

F. Jones and Associates – International Quartz, McClintock Township

On May 31, 1999, the Resident and District geologists visited the International Quartz Quarry north of Fletcher Lake in southern McClintock Township. The quarry is located approximately 12 km northeast of the town of Dorset.

McAuley (1996) provides a detailed description of geology and access to the site. The occurrence has been described variously as a Vein Quartz or as a Pegmatite Related deposit. This site produced the highest average normalized SiO_2 of any site investigated during a project completed by the Ontario Geological Survey in 1995 to evaluate high-purity silica sources and with some beneficiation might meet very high-purity silica specifications McAuley (1996).

Martin (1983) states that quartz constitutes 90% of a pegmatite that cuts metagabbro just west of Fletcher Lake in McClintock Township. The exposed quartz zone measures approximately 180 m in length by 3 to 15 m in width. The vein is composed of 30 cm to 1m wide margins (wall rock zone) of coarse alkali feldspar with flakes and books of partially chloritized biotite. Goad (1990) also noted epidote, muscovite and traces of magnetite and euxenite. The quartz vein is from 3 to 15 m wide and is medium to coarsely crystalline, massive, translucent to locally relatively transparent and milky white to glassy grey. Fracture controlled iron staining is present and varies from orange to brick red (hematite). No other deleterious minerals were noted in the quartz, (McCauley, 1996).

The quarry operates on an on-demand basis under an Aggregate Resource permit producing quartz for decorative stone and commercial purposes. Mr. Jones has applied for an expansion to the permitted area to allow for the development of an additional zone to the east of the current production site and is currently researching additional markets for silica products from his quarry (C. Papertzian & P. Sangster, personal observations, May, 1999).

A. Reed et al Property (Gole Quarry) – Murchison Township

On June 22, 1999 the Regional Resident Geologist and District Geologist accompanied R. Peterson, Queen's University and C. Frances, Harvard University on a visit to the Gole Quarry pegmatite located northwest of the community of Madawaska. The property is located on Lots 14 and 15, Concession IV, Murchison Township.

The main workings on the pegmatite consist of an open cut 500 feet long with an average width of 30 feet and a depth ranging from 10 to 20 feet. Current owners have de-watered the southern end of the pit, removed debris from the pit floor and stripped and blasted an extension to the northeast to join another existing open cut located 50 feet to the northeast.

The deposit has been described as a zoned pegmatite dyke of quartz monzonite composition. The dyke strikes N30°E with a maximum identified length of 260m and a maximum width of 18m. For detailed geology please refer to Storey and Vos, 1981. The deposit was discovered in 1938 and from 1943-44 produced 8 639 tons of quartz and 1 525 tons of feldspar. The quarry was re-opened in 1976 by the Comet Quartz Company, during which time "small amounts of quartz were produced" (Storey and Vos, 1981). From 1984-88 16cu yards of quartz were removed by the Algonquin Mining Company reportedly for piezoelectric and optoelectronic purposes. (Murchison Township assessment Files, Tweed RGP office). Work completed in 1993 for Mr. Alan Reed, the current property holder, concluded that although the potential for identifying an additional large tonnage of silica are good, fracturing, strain and impurities preclude the use of the quartz for semi-conductor, piezoelectric and optoelectronic applications (McAuley 1996). Partners A. Reed, A. Ruben and E. Hoover are currently developing the property under a permit issued under the Aggregate Resources Act. The owners are marketing a soil conditioning product consisting of the powdered pegmatite. They plan to market blocks of pegmatite as ornamental stone and/or landscaping stone.

The site is a well-known mineral collecting locality with allanite and pyrochlore fergusonite crystals associated with biotite being the main specimens of interest. In addition, several other uranium minerals are known to occur in the deposit. The possibility of opening the quarry as a fee-for-collecting sight has been considered (A.Reed, personal communication, June, 1999; P. Sangster, C. Papertzian, personal observations, June, 1999).

AquaRose Gems and Minerals – Rose Quartz and Beryl pits, Lyndoch Township

Four partners in "AquaRose Gems and Minerals" own and operate two pegmatite quarries in northwestern Lyndoch Township. In June, all staff members of the Southern Ontario Resident Geologist Program were given a tour of both properties by R. and H. Farmery. Directions and permits to access the site are sold at the general store in Quadeville.

Known locally as the Beryl Pit and Rose Quartz Pit, both quarries are hosted in zoned granite pegmatites. The Beryl Pit was first discovered in 1897 by Willet G. Miller and saw limited production of beryl from 1935-36. In 1950, additional beryl concentrate stockpiled onsite was sold. (Storey and Vos 1981). In addition to quartz and feldspar, the Rose Quartz Pit was also the site of beryl production in 1935-36.

Miller (1898) and Hewitt (1958, 1967) provide detailed geological descriptions of the deposits. There is no recent mapping of either pit. Goad (1990) mentions a possible albitization or replacement zone at the Beryl Pit site, however, limited exposure prevented a detailed field investigation from being conducted. In addition to feldspar, quartz and beryl, 35 accessory minerals have been identified at this location, including peristerite, cleavelandite, euxenite, columbite, allanite, zircon and monazite. The current owners have completed some rehabilitation of both sites to allow safe access and improved exposures for mineral collectors. Rock dumps at the Beryl Pit are regularly overturned to create fresh exposures for collectors (P. Sangster, personal observations, June 1999).

A. Banner, Ore Chimney Mine – Barrie Township

The Ore Chimney gold mine is located on Lots 34 to 36, Concession 1, Barrie Township, Frontenac County. Exploration and development of this property occurred intermittently from 1909 to 1932. Mine development included the sinking of a vertical shaft that measures 408 feet with drift development on the 108, 150, 250, 300, 332, and the 400-foot levels. Approximately 1 300 feet of drifting that followed a northeast trending quartz vein was conducted on these levels. A winze constructed on the 400-foot level provided an additional 125 feet of vertical access. Since this early mine development, no further underground work has been conducted on the property except for de-watering and sampling on the 150-foot level in 1983.

During the summer of 1999 as part of an OPAP assisted exploration program, the main vein between the shaft and the east pit was stripped, trenched, and channel sampled over a distance of approximately 160 feet. Sixty-four samples collected from 26 cut channels were assayed for gold, silver, copper, lead and zinc. Drill core that was stored at the Tweed drill core library from 2 diamond drill holes that were drilled on the property in 1987 were also re-examined and subsequently re-sampled.

Some of the results from the channel sampling were very encouraging, returning assays of up to 70.0 ounces per ton silver and 0.18 ounces per ton gold over 7 inches on the main vein. Silver assays in excess of 10 ounces per ton were not uncommon over the main quartz vein. Twenty-one samples collected from the diamond drill core stored at the Tweed drill core library returned assays ranging from 0.01 to 0.05 ounces per ton gold and 0.2 to 11.4 ounces per ton silver. The wall rock that was also sampled over distance of 10 feet on either side of the quartz vein returned disappointing assay results.

The property will be re-evaluated this winter and a further exploration program is anticipated for the following field season (A. Banner, personal communication, Jan., 1999; V.C. Papertzian, personal observations, 1999).

RECOMMENDATIONS FOR EXPLORATION

There are many high mineral potential areas in the Southeast District that remain inadequately explored despite the region's long history of mineral exploration and production. Traditional exploration efforts in the Grenville Province in southeastern Ontario have been focused on vein-hosted gold deposits and base metals. In recent decades the focus has also been placed on the search for industrial mineral deposits. There are over 7 000 documented occurrences of gold, base metals and industrial minerals within the District, however, in many cases the early discoveries have not been systematically evaluated.

The geological database for the Grenville Province is extensive but incomplete. With the possible exception of the Long Lake zinc mine and the Marmoraton iron mine, few major metallic mineral deposits of any type have been discovered in the Grenville Province in Ontario. Known occurrences are small in comparison to similar deposits in the Superior province (Easton 1992). Please refer to Tables 10, 11, 12 and 13 of this report for historic production statistics.

Table 9 provides a listing of the known mineral deposits in southeastern Ontario that are not currently being mined. The program emphasis that is currently being placed on the deepening of the Mineral Deposits Inventory (MDI) database includes the re-examination of known occurrences. These studies may help to provide a better understanding of ore-forming processes that were active in the Grenville Province and assist in the formulation of new exploration models that are applicable to the region.

Table 9. Mineral Deposits not Currently Being Mined 1998*– Southeast Ontario District.

Deposit/Township	MDI Number	Status	Commodity	Reserves	Reserve Reference
Ore Chimney Prospect Barrie Township	MDI31C14SE-00142 (SO 1130)	I	Ag, Au, Zn, Pb	11 000 tons above 500-foot level avg. 0.2 oz/ton Au, 5.64 oz/ton Ag, 2% Zn, 1% Pb	MDC 12 p132 MDC 18 p33
Macassa Nickel Limerick Township	MDI31C13SE-00099 (SO 0595)	I	Ni, Cu	2 000 000 tons @ 1% Ni, 0.25% Cu	MDC 12 p138
Renfrew Zinc (Renprior) Admaston Township	MDI31F07NE-00063 (SO 0286)	A	Zn	16 000 tons @ 10.5% Zn to a depth of 30 m Breakwater Resources optioned to Noranda Mining and Exploration, 1996	MDC 12 p226 MDC 20 p17
Harvey Simon Prospect Lyndoch Township	MDI31F03NW-00044 (SO 0259)	I	Cu, Fe, Zn	250 000 tons 1.1% Cu to 350 feet	MDC 12 p226 MDC 20 p45
Clyde Forks Deposit Lavant Township	MDI31F02SE-00064 (SO 0351)	I	Cu, Sb, Ag, Hg	60 000 tons 0.67 % Cu, 0.37% Sb, 0.03% Hg, 1.32 oz/ton Ag	MDC 20 p36
Twin Lakes Diorite Methuen Township	MDI31C12NW-00114 (SO 3840)	I	Ti	13.2 Mt of 21.7% TiO_2, recoverable from open pit to –165 m, with waste rock: ore ratio of 0.54	CIM Bulletin, Vol. 83, No. 934, p99
Grattan Deposit Grattan Township	MDI31F06NE-00017 (SO 0270)	I	Fe	Proven 3 639 600 tons to a vein depth of 363 feet Indicated 9 099 000 tons to a vertical depth of 600 feet. Avg. grade of 27.74% Fe	MDC 20 p98
Radenhurst-Caldwell Deposit Lavant Township	MDI31F02NE-00012 (SO 0349)	I	Fe	Main lens 2 000 feet long x 31.3 feet wide contains 6 500 tons per slope foot at a grade of 32.77% Fe; 3 additional zones totaling 1 600 feet in length Avg. grade17%, 16.7% and 25.5% Fe respectively	MDC 20 p104
Bessemer Deposit Mayo Township	MDI31F04SE-00012 (SO 0235)	I	Fe	No.4 deposit 2 480 819 tons @ 28.62% recoverable Fe	MDC 20 p110
Childs Deposit Mayo Township	MDI31F04SE-00013 (SO 0236)	I	Fe	6 193 330 tons @ 19.25% recoverable Fe	MDC 20 p114

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Deposit/Township	MDI Number	Status	Commodity	Reserves	Reserve Reference
Calabogie Magnetite Property Algoma Ore Prop. Ltd. Bagot Township	MDI31F07SE-00009 (SO 0353)	I	Fe	Reserves of 45 million tons. 25% Fe to 500 feet and 28% Fe to 1 000 feet.	MDC 11 p314
Buckhorn Deposit Bagot Township	MDI31F07NE-00069 (SO0362)	I	Mo	Largest of numerous small lenses contains 1 500 tons @ 1% MoS_2	MDC 20 p132
Bannockburn (Madoc Mining Company Ltd.) Madoc Township	MDI31C12NE-00195 (SO 7274)	A	Au	225 000 tons grading 0.267 oz/ton Au	MP 161 p 377
Cooper Spruce Ridge Resources Ltd Elzevir Township	MDI31C11SW-00044 (SO 2679)	I	Au, Talc	3 Mt @ 30-33% recoverable talc and 40 000 t @ 8 g/t Au	OFR 5945 P 92 OFR 5808 P 79
Dingman Deposit Deloro Minerals Ltd. Marmora Township	MDI31C12SE-00040 (SO 3590)	A	Au	7 Mt @ 1.8 g/t Au	OFR 5958 P 11 13
Hawley Ram Petroleum Limited Olden Township	MDI31C10NW-00117 (SO 4057)	A	Wollastonite	2.5 Mt @ 32% wollastonite to vertical depth of 75m	OFR 5943 P 337
Marmora Gitennes Exploration Inc. Marmora Township	MDI31C12SE-00096 (SO 3729)	I	Wollastonite	450 000 t (open pit) @ 47% wollastonite, plus 680 000 t @ 39% wollastonite in a separate zone	OFR 5715 P 50
Trudeau C. Roger Young Hungerford Township	MDI31C11SW-00049 (SO 1192)	A	Calcite, Dolomite	4 Mt high-purity dolomite No estimate available for calcite zone	OFR 5958 p. 11-11
Verona-Kirkham Stewart Lake Resources Inc. Bedford Township	MDI31C10SE-00023 (SO 1244)	I	Graphite	1.6 Mt grading 9.5% graphite in 2 separate zones	MDC 33 p 16
Cal Graphite Corp. Butt Township	MDI31E11NE-00004 (N0129)	I	Graphite	Reserves of 60 Mt grading 3% graphitic carbon	MDC 33 p 10
Globe Graphite Mine North Elmsley Township	MDI31C16SE-00016 (SO 1604)	I	Graphite	500 000 t of approximately 7% graphite below mined out portion, to the 300-foot level.	MDC 33 p 25
St. Lawrence Pacific Coast Mines Inc. Pittsburgh Township	MDI31C08NW-00058 (SO 8487)	I	Wollastonite	9-11 Mt @ 43% wollastonite; 4-5 Mt @ 34% wollastonite	MNDM www 1997

**(Table does not include nepheline syenite, trap rock, REE and dimension stone deposits.)*

Table 10. Historic Production of Gold – Southeast Ontario District

Mine	Township	Operating	Tons Milled	Ounces Produced	Grade Oz/Ton
Big Dipper	Barrie	1907,-09	52	17	0.33
Cook	Marmora	1901-01,-04	1483	289	0.26
Cordova	Belmont	1892	120 670	22 774	0.19
Craig	Tudor	1905-06	1 850	248	0.13
Deloro	Marmora	1897-02	39,143	10 360	0.26
Gatling 5 Acre	Marmora	1900-03	6 114	2 353	0.38
Gilmour	Grimsthorpe	1909-10	550	172	0.31
Golden Fleece	Kaladar	1919,-22	Unknown	480	Unknown
Ledyard	Belmont	1893-94	55	13	0.24
Pearce	Marmora	1893,-08	239	302	1.26
Sophia	Madoc	1900,-41	1800	110	0.06
Sovereign	Marmora	1878 1892-92,-00	Unknown 1 962	970 370	Unknown 0.19
Star of the East	Barrie	1905,-07	976	134	0.14
		Total	**174 894**	**38 592**	

Table 11. Historic Production of Copper, Lead, Zinc – Southeast Ontario District

Mine	Township	Operating	Tons Milled	Production
Kingdon	Fitzroy	1884-85 1914-31	905,000	76 821 409 lbs. Pb conc. 857 312 lbs. Zn conc. 60 074 072 lbs. Pb rec.
Long Lake	Olden	1897-25	3 442	$41 550 ore value
		1973-74	NA	9 467 tons Zn valued at $1 227 000
Eldorado Copper	Madoc	1906	NA	234 000 lbs copper matte containing 230 oz Au, 182 oz Ag, 109 000 lbs Cu
Hollandia Lead	Madoc	1903-06	NA	2 653 365 lbs. Pb

Table 12. Historic Production of Iron – Southeast Ontario District

Mine	Township	Operating	Tons Milled	Grade (% Fe)
Calabogie	Bagot	1883-1901	10 000	26
Martel	Bagot	Pre 1890	2 000	58.71
Williams (Black Bay)	Bagot	1880-90	25 000	51.89
Black Lake	Bedford	1882-1884	4 000	40
Glendower	Bedford	1873-1895	50 000	50-60
Belmont (Ledyard)	Belmont	1899-1900, 1911-1913	8 433	51.2
Blairton	Belmont	1820-1875	300 000	51.8
Playfair (Dalhousie)	Dalhousie	1866-71	11 100	57.6
Radnor	Grattan	1901-1907	18 824	47.5
Eagle Lake (Blessington)	Hinchinbrooke	1887-1891	700	65.55
Tomahawk (Mag-Iron)	Lake	1947, 1950-57	2 096	50.9
Wilbur	Lavant	Pre 1900, 1907-8	146 892	56.69
Magnetawan	Lount	1910-1912	6 000	59.55
Paxton	Lutterworth	Before 1910	1 000	NA
Miller	Madoc	1899	6 823	NA
Wallbridge	Madoc	1900-01, 1919, 1921	3 421	NA
Marmoraton	Marmora	1952-1978	28 000 000	40
Bessemer	Mayo	1902-13	99 613	42.18
Childs	Mayo	1913	9 649	38.7
McNab	McNab	1873-74	15 000	68
Robertsville & Mary	Palmerston	1895, 1900-1, 1918-9	13 477	70.5
Fournier	S. Sherbrooke	1873	600	60
Howland	Snowdon	1880-2	1 500	58
Victoria	Snowdon	1882	?	58.35
Dog Lake	Storrington	1899	600	51.12
St. Charles	Tudor	1900-02	5 186	57-60
Coe Hill	Wollaston	1884-1914	100 000	51.4
Total			**28 841 914**	

Table 13. Historic Production of Fluorite – Southeast Ontario District

Mine	MDI Number	Township	Operating	Total Production (Tons)
Bailey	31C06NW00003	Madoc	1907, 1916, 1917, 1944-50	25 000
Blakely	31C06NW00019	Huntingdon	1918-20, 1928, 1941-47	5 026
Coe	31C06NW00008	Huntingdon	1941-42	114
Dwyer	31E01SE00091	Cardiff	1918-20, 1943, 1944	97
Herrington South	31C05NE00009	Huntingdon	1917	13
Howard, Fred Hill	31C06NW00014	Huntingdon	1918, 1920, 1929, 1940-42, 1944	2 500
Johnston	31C06NW00013	Huntingdon	1943, 1944-47, 1949	187
Keene	31C06NW00004	Huntingdon	1918-19, 1943, 1944, 1950	5 000
Kilpatrick	31C06NW00005	Huntingdon	1944, 1953-1959	11 566
Lee Junior	31C05NE00008	Madoc	1917, 1940, 1943-45	2 000
Lee Senior	31C05NE00006	Madoc	1916-1918, 1942, 1943	1 600
McIlroy	31C05NE00003	Madoc	1917-18, 1923, 1944	540
Miller	31C05NE00005	Madoc	1917-1919	460
Noyes	31C06NW00011	Huntingdon	1917-20, 1941-43	25 000
Palmateer	31C06NW00016	Huntingdon	1942	44
Perry	31C06NW00009	Huntingdon	1915-20, 1941-43	8 000
Perry Lake	31C06NW00007	Huntingdon	1910, 1913, 1915, 1917, 1952, 1960	4 000
Ponton	31C05NE00004	Madoc	1929-1942	1 500
Rogers	31C06NW00018	Huntingdon	1909-1914, 1943-51	45 000
Rooks	31C12SE00003	Madoc	1916-18	100
South Reynolds	31C06NW00010	Huntingdon	1917-18, 1943	100
Wallbridge & Herrington	31C05NE00007	Madoc	1920-1922, 1941-1943	6 600
William Reynolds	31C12SE00002	Madoc	1941-42	88

Fluorspar, a commercial fluorite product, is used as a flux in the making of steel and ceramics, as a constituent in the electrolytic process of making aluminum and in the production of hydrofluoric acid (HF). During World War II, a Canadian Government assistance program, in the form of loans and drill hole explorations stimulated development of the Madoc deposits (G. Guillet, IMR 12, p.1).

Pegmatite Resources

During the 1999 field season, staff of the Southern Ontario Regional Resident Geologist Office visited 5 pegmatite occurrences, all of which were discovered pre-1940 and have seen past production. Two sites operate on a fee-for-collecting basis and two are under development as silica and/or feldspar producers. The fifth site is currently inactive.

Historic production from pegmatites in southeastern Ontario was restricted to zoned pegmatites that were selectively mined and hand-cobbed for feldspar, quartz, beryl, corundum and mica. The potential for recovering quartz, feldspar, mica, rare earth minerals, lithium and beryllium from numerous homogenous pegmatitic bodies in the Pembroke – Renfrew area has not been explored.

There are 82 rare earth element occurrences in southern Ontario associated with pegmatite dykes. Many of the pegmatites are concentrated within the Bancroft Terrane of the Central Metasedimentary Belt and are generally similar in setting and timing to the rare element and uraniferous pegmatites of the Superior Province (Easton 1992).

Other pegmatite dykes mapped in Lyndoch, Brudenell and Radcliffe townships may warrant a closer examination for rare earth element potential. An examination of technical reports and publications revealed no documentation of previous exploration in Radcliffe and Brudenell townships, and geological mapping was last conducted over this area during the late 1940's. There are no active mining claims in Radcliffe and Brudenell townships.

Further examination of the southeastern Ontario pegmatite occurrences is recommended for a variety of commodities including, but not limited to rare earth elements, silica and feldspar.

Mica

Canada presently produces approximately 17 500 t of mica per year.

Micas are used in a wide variety of products depending upon the flake size. Coarse flake material is used in the oil well drilling industry while the superfine powder is used in paints, plastics, rubber products and paper. The intermediate flake sizes are used in concrete block fillers, refractory bricks, gypsum boards, asphalt, roofing felts, shingles, absorbent in explosives, disinfectants, automotive components, welding electrodes, cables, wires, pipeline enamels, mastics, lubricants, textured paints, acoustical plasters and ceiling tiles.

Today there is a growing use of muscovite in place of phlogopite. Wet-ground mica is being used on an increasing basis and there is also a demand for transformed and high quality mica products.

The production growth rate for ground mica for the near future is 1 to 3 per cent per year. Demand tends to be tied to housing starts, interest rates and sales in the automotive industry. This filler is used in exterior and interior parts of a automobile along with the finish paint.

The forecasted demand in 2000 for crude and ground mica will increase. The demand for dry and wet ground micas is expected to increase due to demands from the cosmetics industry and pearlescent paints used in the automotive industry. Demand for dry ground mica is expected to increase by as much as 3% through the year 2005 while the demand for block mica is expected to grow as well in a few specialty markets. There is at present a shortage of block mica due to the low percentage of high quality mica being mined. With no new applications for sheet mica emerging, demand for this type of mica has leveled off (Hendrick, USGS, Minerals Information, 1998).

There are over 200 documented mica occurrences in southeastern Ontario. The Kozumi mica deposit near Kaladar is currently being evaluated.

A large deposit of fine-grained muscovite is found in the pelitic schists of the Flinton Group near Fernleigh. The schists also contain ancillary minerals such as garnet, sillimanite, feldspar, staurolite and magnetite that can be extracted and sold where the combined quantities of these minerals are greater than 60 per cent.

The muscovite quartz-schist unit between the towns of Fernleigh and Ardoch ranges from 100 to 350 feet in width and has a strike length of approximately 5 miles. Staurolite, kyanite, sillimanite, plagioclase, garnet and biotite all occur within this schist as well. A second band of lower grade muscovite occurs approximately 3 miles north of Ardoch. It ranges up to 1000 feet in width and has a strike length of 1.5 miles.

Further examination of these and other mica occurrences of southeastern Ontario as a potential source of mineral fillers is recommended.

Dimension Stone

The Mountain Grove Mafic Intrusion is located in southeastern Olden Township, 1km southeast of the community of Mountain Grove. The maximum dimension of this mafic body is 7km.

The intrusion is described by Wolff (1982, p.30) as follows:

> "Compositionally, the body varies from gabbro and quartz gabbro to anorthosite, monzonite and syenite. Outcrops of these units tend to be small and massive with locally developed penetrative fractures. Individual outcrops may have more than one phase present. Igneous layering or banding, however, is absent and the different phases have irregular contacts. Locally, intrusive breccias between phases are observed."

One location in the intrusion was sampled in 1985 and 1986 as part of a regional building stone program. A single sample of black gabbro, 86-OLD-27, (taken from an outcrop along Brewers Road) was cut and polished at that time. The rock at this site is an attractive, massive black gabbro that contains trace amounts of pyrite and felsic stringers along with intense, irregular fracturing. The grain size is medium to coarse while the texture is massive.

The irregular fracturing and the deleterious minerals found at this particular site make it a poor prospect for building stone. A reconnaissance of the Mountain Grove area completed by the Southeast District Geologist and Regional Resident Geologist in 1999 identified a large area of this intrusion that has never been systematically evaluated for building stone potential. It is recommended that a more detailed survey of this intrusion be carried out in the search for a "black granite".

Kimberlite Dykes of Southern Ontario

The first recorded discovery of a diamond in Canada was made near Peterborough, Ontario, prior to 1920. Details of the discovery are vague. The source of the 33-carat stone has not been identified but it is thought to have been found during the construction of the railway between Ottawa and Peterborough, presumably in surficial deposits, (Brummer, 1974). The stone was rough, broken and of little value as a gem. Local newspapers in the late 1800's report the discovery of a "Port Hope Diamond" but no confirmation of this occurrence has been found. To date there are two documented kimberlite dyke occurrences in southeastern Ontario and a third kimberlite occurrence unconfirmed by field investigation. The two verified occurrences, the Picton and Varty Lake dykes intrude Paleozoic limestone (Barnett et al 1984). The third occurrence, the Addington kimberlite, reportedly intrudes Precambrian mafic to felsic metavolcanic rocks of the Central Metasedimentary Belt.

The Picton dyke intrudes limestones of the Ordovician Black River and Trenton Groups and is exposed in three bench levels and on the floor of a producing cement quarry near Picton in Prince Edward County. The dyke varies in width from 0.2 to 0.7m. Strike is 105° with dip ranging from vertical to 70°S. Recent quarrying activities have provided a fresh face for examination and abundant broken rock for sample collection. The dyke trends approximately normal to the north-northeast trending regional faults. Emplacement may be related to reactivation of Grenville-age basement faults during Jurassic period magmatism.

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More than half of Prince Edward County has shallow soils with less than 1m of unconsolidated material covering the bedrock. Approximately 10% of the county is covered by marsh and other organic soils. Generally glacial till in the area is less than 1m thick, except in drumlinoid deposits near Picton and West Lake. There are 48 sand and gravel pits and a number of limestone quarries in the County. Airborne geophysical surveys and geochemical coverage of the area are extremely limited.

The Varty Lake dyke intrudes limestones of the Ordovician Black River and Trenton Groups in Camden Township 9km northeast of the town of Napanee. The dyke is intermittently exposed over 150m in a series of 5 pits. In the best exposure the dyke is 1.5m wide and is vertical, with a strike of 120°. The dyke trends approximately normal to the north-northeast trending regional faults. Emplacement may be related to reactivation of Grenville-age basement faults during Jurassic period magmatism. The pits in which the dyke is exposed were dug in the 1890's by the Gold Horn Mining syndicate as part of an unsuccessful gold exploration program. In 1998, the property holders back-filled the pits as a safety measure. Airborne geophysical surveys and geochemical coverage of the area are extremely limited. There are numerous pits and quarries in the area that have not been explored for kimberlite occurrences.

In 1989, a hand specimen reportedly retrieved from the waste dump at the past producing Addington Gold Mine was given to Monopros and identified as kimberlite. The exact location of the sample is not known. It is known that the local township road department had been using material from the mine's waste dump as road fill and in 1989 had overturned the dump and extract crushed rock – the specimen may have been buried in the dump and protected from weathering (G.Grabowski, personal communication, Dec 1999, P.W. Kingston, personal communication, Dec. 1999).

Further examination of selected areas in southeastern Ontario for additional kimberlite occurrences is recommended.

OGS ACTIVITIES AND RESEARCH BY OTHERS

There were no Ontario Geological Survey field projects in Southern Ontario in 1999.

D. Andjelkovic and A.R. Cruden, University of Toronto, have an ongoing research program to study relationships between fractures in Paleozoic cover rocks and structures in the Precambrian basement in south central Ontario. Mr. Andjelkovic used the Tweed RGO office as a base of operations for his field program.

A detailed description of this program is given in Summary of Field Work and Other Activities, Ontario Geological Survey, 1998. For a listing of Ontario Geological Survey Publications in 1999 related to the District, please refer to Table 14.

Table 14. Publications of Ontario Geological Survey Activities, 1999 - Southeast Ontario District.

Title	Author	Type and Year of Publication
Summary of Field Work and Other Activities 1998	Edited by Ayer, J.A., Baker, C.L., Ireland, J.C., Kelly, R.I. and Thurston, P.C.	MP 169, 1999
Aggregate Resources Inventory of Prince Edward County	Jagger Hims Limited and the Ontario Geological Survey	ARIP 172, 1999
Sand and Gravel Resources for Prince Edward County	Jagger Hims Limited and the Ontario Geological Survey	ARIM 172-1, 1999
Bedrock Resources for Prince Edward County	Jagger Hims Limited and the Ontario Geological Survey	ARIM 172-2, 1999
Aggregate Resources Inventory of Lennox and Addington County	Jagger Hims Limited and the Ontario Geological Survey	ARIP 171, 1999
Sand and Gravel Resources of Lennox and Addington County, Southern Sheet	Jagger Hims Limited and the Ontario Geological Survey	ARIM 171-1A, 1999

Title	Author	Type and Year of Publication
Bedrock Resources of Lennox and Addington County, Southern Sheet	Jagger Hims Limited and the Ontario Geological Survey	ARIM 171-2A, 1999
Sand and Gravel Resources of Lennox and Addington County, Central Sheet	Jagger Hims Limited and the Ontario Geological Survey	ARIM 171-1B, 1999
Bedrock Resources of Lennox and Addington County, Central Sheet	Jagger Hims Limited and the Ontario Geological Survey	ARIM 171-2B, 1999
Sand and Gravel Resources of Lennox and Addington County, Northern Sheet	Jagger Hims Limited and the Ontario Geological Survey	ARIM 171-1C, 1999
Report of Activities 1998, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeast and Southwest Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Stewart, J.M. and Carter, T.R.	OFR 5992, 1999
Results of Paleozoic Bedrock Drilling Project, Northern Lake Simcoe Area, South-Central Ontario	Armstrong, D.K.	OFR 5999, 1999
Summary of Field Work and Other Activities, 1999	Edited by Ayer, J.A., Baker, C.L., Kelly, R.I., Stott, G.M. and Thurston, P.C.	OFR 6000, 1999

Rehabilitation of Abandoned Mines

The Ontario government will spend $516 000 to cap or backfill 31 abandoned mine sites across the province during fiscal year 1999-2000. Capping is the placement of an engineered concrete cover over a shaft. Back filling of pits, deep trenches, open stopes or shallow shafts will be accomplished through blasting or by importing backfill material. The funding is part of a four-year $27-million provincial program to restore former mining lands to productive use.

In Tweed, $53 223 is to be spent on the Gawley No. 1, the Blakely Fluorite Mine and the Maloney site. The contract has been awarded to Geo-Logic Inc.

In 1998, the Hollandia lead property in Madoc Township was rehabilitated. Four shafts along with a number of deep trenches were blasted and subsequently filled.

In the second year of this program, the Ontario government will spend $4 million on rehabilitation work as well as $1 million on site assessments of more than 3 000 sites across the province.

REFERENCES

Allen, C.C., 1974. Assessment Report, Ruby Garnet Property, Lot 3, ConXV, Ashby Township; Tweed Resident Geologist Office, T.O. 2.1489.

Barnett, R.L. et al 1984. The Picton and Varty Lake Ultramafic dikes: Jurassic Magmatism in the St. Lawrence Platform near Belleville, Ontario, Canadian Journal of Earth Sciences, Vol. 21 #12, p.1460-1470.

Brummer, J.J. 1978. Diamonds in Canada, CIMM Bulletin 71 (798), p.64-79.

Easton, R.M. 1992. Metallogeny of the Grenville Province; in Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 2, p.1217-1252.

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Easton, R.M. 1999. Geology and Mineral Potential of the Puzzle Lake Area, Central Metasedimentary Belt, Grenville Province: In Summary of Field Work and Other Activities, Ontario Geological Survey, 1998, Miscellaneous Paper 169, p.209-215.

Evans, A.M., 1964. Geology of Ashby and Denbigh Townships, Lennox and Addington County, Ontario Department of Mines Geological Report No. 26, Toronto 1964, with coloured maps 2031 and 2049.

Guillet, G.R., 1964. Fluorspar in Ontario, Ontario Department of Mines, Industrial Mineral Report No. 12.

Goad, B.E. 1990. Granitic Pegmatites of the Bancroft area, southeastern Ontario; Ontario Geological Survey Open File Report 5717, 459p.

Harburn, P. 1996. Industrial Minerals, A Global Geology. Industrial Minerals Information Ltd., Surrey, UK 462pp.

Hewitt, D.F. 1953. Geology of the Brudenell-Raglan area; Ontario Department of Mines, Volume 62, Part 5, p.1-101 accompanied by Map 1953-2.

Hewitt, D.F. 1967. Pegmatite Mineral Resources of Ontario, Industrial Mineral Report 21.

Kingston, P.W. and MacKinnon, A. 1990. New Industrial Minerals in southeastern Ontario, CIMM Bulletin Vol. 83, No. 93 pp 92-100.

Martin, W. 1983 Industrial Minerals of the Algonquin region, Ontario Geological Survey Open File Report 5425, 314p.

McAuley, J. 1996. An evaluation of high-purity silica sources: preliminary site investigations, Volume 1; Ontario Geological Survey, Open File Report 5948, 481p.

Meen, V. B. 1942. Ontario Department of Mines, Annual report Volume LI, Part IV, 50p accompanied by Map 51d.

Papertzian, V.C. 1984 Gold Occurrences of Barrie Township, Unpublished Report, Southern Ontario Regional Resident Geologist, Southeast District files, 14p.

Sangster, P.J., Papertzian, V.C., Steele, K.G., Laidlaw, D.A., Stewart, J.M. and Carter, T.R. 1998. Report of Activities 1997, Resident Geologist Program, Southern Ontario Regional Resident Geologist's Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre; Ontario Geological Survey, Open File Report 5974, 59p.

Sangster, P.J., McGuinty, W.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Stewart, J.M. and Carter, T.R. 1999. Report of Activities 1998, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeast and Southwest Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre, Ontario Geological Survey, Open File Report 5992, 59p.

Stewart, R.V., 1991. Assessment Report, Ruby Garnet Property, Lot 3, ConXV, Ashby Township; Tweed Resident Geologist Office, T.O. 2.14604.

Stewart, R.V., 1991. Assessment Report, Ruby Garnet Property, Lot 3, ConXV, Ashby Township; Tweed Resident Geologist Office, T.O. 2.19884.

Storey, C.C. and Vos, M.A. 1981. Industrial Minerals in the Pembroke-Renfrew Area, Part 2; Ontario Geological Survey, Mineral Deposits Circular 22, 214 p. Accompanied by Preliminary Map P.2209, Scale 1:126 720.

Wolff, J.M. 1982. Geology of the Long Lake Area, Lennox and Addington and Frontenac Counties; Ontario

Geological Survey, Report 216, 76p. Accompanied by Map 2449, scale 1:131 680.

USGS, 1999. Mineral Commodity Summaries.

Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Southwest Ontario District)–1999

by

K.G. Steele

2000

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SOUTHERN ONTARIO REGIONAL RESIDENT GEOLOGIST (SOUTHWEST ONTARIO DISTRICT)–1999

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INTRODUCTION

In 1999, a conservative estimate of mining and quarrying of minerals in the Southwest Ontario District is $1 billion of production, or approximately 20% of Ontario's mineral out-put. The location of the 4 mines, 38 quarries and 3 brine well fields that actively produced industrial minerals, non-aggregate stone and building stone throughout the year in Southwest Ontario are shown in Figure 1. Many mineral industry operators reported increased production and strong markets, particularly in the cement, gypsum, brick and building stone industries. In the Southwest Ontario District, overall employment at non-aggregate industrial mineral extraction sites and associated processing facilities increased over 1998. In 1999, advanced planning and/or development started or continued on at least seven projects, including the opening of new quarries or the expansion/re-opening of existing operations. Construction work is well under way at Canada Brick's Aldershot West Quarry where a new brick plant will be completed in the latter part of 2000.

Recommendations are presented for the exploration of landscaping/dimension stone in the Wiarton and Orillia areas. Exploration and development opportunities exist for salt, gypsum, silica, high-purity and cement grade limestone, high-purity dolostone, and brick quality shale across southwest Ontario.

MINING ACTIVITY

All mineral production in the Southwest Ontario District is classified as industrial minerals. In 1999, it is estimated the mining and quarrying of minerals in the Southwest Ontario District resulted in at least $1 billion of production.

The total value of Ontario's industrial mineral production in 1998 (the last year for which statistics are available) was $1.72 billion, or 34% of the total value of mineral production in the province (see Table 1). Ontario is Canada's leading producer of nepheline syenite, salt, talc, clay/shale products, cement, lime, sand and gravel and stone, and a major producer of gypsum and silica. All of the province's salt and gypsum production, almost all of the clay/shale products and lime production, as well as a large percentage of its' cement, sand and gravel, and stone production are from the Southwest Ontario District.

The locations of all active mineral extraction operations in Southwest Ontario are shown on Figure 1. The mines, quarries and brine well fields listed extract a variety of commodities for numerous end products, including salt (road salt, chemicals), gypsum (wallboard), limestone (lime, cement) shale (cement, bricks), dolostone (chemicals, building stone), and sandstone and gneiss (building stone). Operations that extract construction aggregate or petroleum products are not shown. Production figures for the four underground mining operations in Southwest Ontario are listed in Table 2.

Salt

Resource Geology

Salt deposits in Ontario occur within Late Silurian Salina Formation strata in the Windsor and Sarnia-Goderich areas near the eastern edge of the Michigan Basin, as well as in the Chatham area within a structural depression known as the Chatham Sag. The Salina Formation is divided into eight units. Salt occurs within four of these units in Ontario; the A-2, B, D, and F units. The A-2 salt bed is widespread throughout the Sarnia-Goderich area and underlying Lake Huron, attains a maximum thickness of 45 m near Sarnia, but does not occur to the south. Unit B is the thickest of the salt units, reaching a maximum thickness of 90 m at Sarnia and an average of 45 m over the Chatham Sag. This unit often contains numerous thin interbeds of anhydrite, dolomite and dolomitic shale. Unit F contains numerous salt beds in Ontario, the combination of which varies up to a maximum of 90 m in thickness at Sarnia.

Producers/Recent Developments

In 1999, three companies extracted salt in Ontario, all within the Southwest Ontario District (Figure 1). Sifto Canada Inc. , located at Goderich and The Canadian Salt Company Limited, located in south Windsor operate both rock salt mines and brine well fields. General Chemical Canada Limited operates Ontario's largest brine well field, south of Windsor near Amherstburg.

In 1999, rock salt production was reduced from previous years due to a series of mild winters with limited snowfall in the Great Lakes region, thus reducing the demand for road salt (Table 2). Salt from brine production remained at or close to plant capacities.

In mid 1999, specialty chemicals giant Rohm and Haas Company acquired Morton International Inc., the parent company of The Canadian Salt Company Ltd.

Gypsum

Resource Geology

Gypsum is widespread in the Upper Silurian Salina Formation in south central Ontario along the southeastern flank of the Algonquin Arch, which separates the Michigan and Appalachian basins. Gypsum is known in the subsurface from Woodstock east to Niagara Falls and occurs in a number of thin, lenticular beds interbedded with dolomite and dolomitic shale. The Salina Formation is divided into eight units. Gypsum is mined from the B and E units in Ontario. A recently closed mine extracted from the A-2 unit. The most recent research on gypsum deposits in southern Ontario are Haynes and Hughes-Pearl, 1990a and 1990b.

Producers/Recent Developments

Numerous small mines have been in production from the Salina Formation since as early as 1822. The early mines extracted gypsum from tunnels dug into the banks of the Grand River between Paris and Cayuga (Guillet, 1964). Gypsum is presently mined at two locations; at Caledonia by Georgia-Pacific Canada Inc. and at Hagersville by CGC Inc. Both operations have on-site wallboard manufacturing facilities. Westroc Inc., operator of the Drumbo Mine from 1978 until its closure in 1995, continues to operate a wallboard facility in Mississauga, Ontario using flue gas desulphurization gypsum supplied by Ontario Hydro and other sources. All past and present gypsum mines are in the Southwest Ontario District.

In 1999, Georgia-Pacific Canada Inc. mined 418 000 tonnes of gypsum from their Caledonia No. 3 Mine. The mine is in the midst of capital improvements comprised of the sinking of a new ventilation shaft and the purchase of a third continuous mining machine, both to be operational in 2000. The additional continuous miner will increase mining capacity to 450 000 tonnes per year. CGC Inc.'s Hagersville Mine extracted 725 000 tonnes during the year and is also undergoing capital improvements with the sinking of a maintenance shaft.

Total gypsum production in 1999 from all Ontario operations was 1 143 000 tonnes; indicative of the steady, increasing trend in production over the past several years (Table 1) and reflecting the strong Ontario and North American market for wallboard and mining and manufacturing efficiencies.

Cement

Resource Geology

The cement industry uses limestone resources from south central and southwestern Ontario. In south central Ontario, limestone of the Middle Ordovician Verulam Formation and the overlying Upper Ordovician Lindsay Formation is extracted from quarries along the north shore of Lake Ontario. In southwest Ontario, cement quarries located approximately half way between Kitchener and London extract Middle Devonian age limestone from the Amherstburg, Lucas and Dundee formations. These geological units are presented in ascending stratigraphic order.

The Verulam Formation and the overlying Lindsay Formation form the upper portion of the Simcoe Group in south central Ontario. The two units outcrop within a triangular region cornered by Kingston, Oshawa and Collingwood. The Verulam Formation consists of micritic to coarse-grained, fossiliferous limestone interbedded with calcareous shale. The Lindsay Formation is subdivided into two members; a lower limestone member and the upper black, calcareous shale Collingwood Member. The lower, unnamed member is an argillaceous, nodular, fine to coarse-grained, fossiliferous and bioturbated limestone. The overlying Collingwood Member is typically fossil-rich, interbedded black, organic-rich limestone and highly calcareous black shale.

The Amherstburg and the overlying Lucas formations in southwest Ontario are part of the Detroit River Group that underlies the southern portion of the Windsor-Essex area, and forms a belt extending from the Woodstock-Ingersoll area north to Kincardine on Lake Huron. The Amherstburg Formation consists of a banded, fossil-rich, bituminous, cherty, bioclastic limestone that is conformably overlain by the Lucas Formation that, in the Woodstock-St. Marys area, consists of bioclastic, microcrystalline limestone to dolomitic limestone.

A sharp, erosional contact separates the Lucas Formation from the overlying Dundee Formation, which consists of medium to thick-bedded, fossiliferous, micritic limestone with bituminous partings and chert nodules. The Dundee Formation subcrops in a broad, northwest trending belt that extends from central Lake Erie to Lake Huron and also underlies the northern portion of the Windsor-Essex area.

The last comprehensive report on the limestone industries in Ontario, including cement, was conducted in 1989 (Derry, Michener, Booth and Wahl and OGS, 1989).

Producers/Recent Developments

Five separate companies currently own and operate seven cement plants within south-central and southwest Ontario. Five of the cement plans and three limestone source rock quarries are located in the Southwest Ontario District. Blue Circle Cement operates quarry/cement plant complexes at Bowmanville and St. Marys. Lafarge Canada Inc. operates a quarry and cement plant near Woodstock. Along the Lake Ontario shoreline immediately west of Toronto, is the St. Lawrence Cement Inc. Mississauga Cement Plant and adjacent shale quarry. Limestone is shipped to this plant from south-central Ontario. Federal White Cement Ltd. operates a cement plant near Woodstock; the limestone raw material is purchased from a local quarry.

Total cement production in the Southwest Ontario District during the year was over 5 million tonnes. All plants reported increased production in 1999 due to strong markets in the Great Lakes region and all are undertaking technology and equipment upgrades to meet increased demand.

Clay/Shale Products

Resource Geology

The clay products industry in Ontario currently extracts resource materials from the Queenston and Arkona Formation shale horizons. A significant amount of historical production came from Georgian Bay Formation shale.

The Late Ordovician Georgian Bay and the overlying Queenston formations occupy a narrow, wedge-shaped area located immediately east of the Niagara Escarpment and extends from Georgian Bay to the Toronto and Hamilton areas. The Queenston Formation also forms the bedrock of an area bounded by Lake Ontario and the Niagara Escarpment between Hamilton and Niagara Falls, and in eastern Ontario, it is found to outcrop in a small area southeast of Ottawa. Much of the area underlain by the Georgian Bay and Queenston formations is highly urbanized, especially in the Niagara Falls-Hamilton-Toronto area.

The Georgian Bay Formation is a moderately soft, blue-grey shale with minor hard beds and lenses of limey or sandy composition (Guillet and Joyce, 1987). Georgian Bay shale can be used to make heavy clay products if the hard layers are removed.

The Queenston Formation is a thick sequence of red shale prominently exposed along the base of the Niagara Escarpment. It is a maroon, slightly calcareous to noncalcareous, locally gypsum-bearing shale with interbeds of grey-green shale, limestone and calcareous siltstone. The grey-green beds have a higher lime content. The shale breaks down readily by weathering, leaving a softer residual material that is somewhat leached of lime and exhibits improved ceramic properties.

The Middle Devonian Arkona Formation is part of the Hamilton Group that underlies an irregular area extending west and south of London. It consists of poorly exposed, soft, easily weathered, blue-grey shale with occasional thin argillaceous limestone interbeds.

Producers/Recent Developments

In 1999, four companies extracted shale at seven quarries in southwest Ontario for heavy clay products. The shale supplied five brick and tile manufacturing operations within the District.

Two large operators, Canada Brick and Brampton Brick, have both quarrying and manufacturing facilities in the province. Two small quarries, one operated by Amos C. Martin Ltd. near Georgetown and the other operated by George Coultis & Son Ltd. near Thedford, Ontario, supplied shale to Century Brick Ltd. and Paisley Brick and Tile Co. Queenston shale is extracted from the quarry at Georgetown, whereas Arkona Formation shale forms the resource rock at the Thedford Quarry.

In 1999, Canada Brick quarried Queenston shale at their Streetsville, Milton, Burlington and Aldershot West quarries located between Toronto and Hamilton. Canada Brick currently operates three large brick plants; one beside their Streetsville Quarry and two adjacent to their Burlington Quarry. In response to continuing strong demand for brick in the southern Ontario market, the company is currently building a new 150 million brick unit per year plant at the Aldershot West Quarry (see Advanced Exploration and Development). With this expansion Canada Brick will

have a production capacity of 480 million brick units per year from their Ontario plants. The company currently holds a 70% share of the Ontario and Quebec brick market. In April 1999, Jannock Ltd. sold Canada Brick to Hanson PLC of Britain.

Brampton Brick Ltd. currently trucks Queenston shale from their Cheltanham Quarry a distance of 10 km to their brick plant in northwest Brampton. In 1999, the Ontario housing boom prompted Brampton Brick to begin a $33 million plant expansion. The project includes the installation of a third kiln and when completed in 2000, production capacity will have increased from 120 to 200 million brick units per year.

Chemical, Metallurgical & Filler Limestone and Dolostone Products

Resource Geology

The chemical, metallurgical and filler limestone and dolostone products industry in Ontario uses calcium-rich limestone and calcium/magnesium-rich dolostone, predominantly from resources found in southwest Ontario, as raw materials for manufacturing lime and associated products. There is a limited distribution of high-purity calcite and dolomite within Ontario, as documented by Kelly (1996).

A number of formations contain high-purity limestone within southwest Ontario. The industry currently exploits or plans to develop deposits within the Detroit River Group Lucas and Amherstburg (Formosa Reef limestone) formations. High-purity dolostone deposits used by the industry occur within the Guelph and Amabel formations.

The geological units utilized by the industry in ascending stratigraphic order are the Amabel, Guelph and Lucas formations. The Middle Silurian Amabel Formation consists primarily of fine to medium crystalline, white to light grey dolostone and is highly exposed along the top of the Niagara Escarpment. Chemical analyses of samples collected from a number of quarries and outcrop locations reveal the formation to be high-purity dolostone, (Kelly, 1996). The last comprehensive report on the limestone industries in Ontario was conducted in 1989 (Derry, Michener, Booth and Wahl and OGS, 1989).

The Middle Silurian Guelph Formation immediately overlies the Amabel Formation. Previously assigned to the Amabel Formation, the Eramosa Member is now included as the basal unit of the Guelph Formation. The Eramosa Member is a bituminous, light tan to dark brown, thin-bedded dolostone. Chemical analyses conducted on the Eramosa Member from samples collected at the Dundas Quarry indicate the rock consists of high-purity dolostone. Above the Eramosa Member, the Guelph Formation is a white to tan, fossiliferous, sugary, fine to medium crystalline dolostone unit that locally consists of high-magnesium dolomite. There are numerous exposures of the formation along the top and immediately west of the Niagara Escarpment.

The Middle Devonian Detroit River Group includes the Amherstburg Formation and the overlying Lucas Formation. The Group underlies two areas in southwest Ontario; a belt trending northwest from Woodstock to Lake Huron and an area south of Windsor. The Amherstburg Formation consists of a tan to brown, bioclastic, bituminous, cherty limestone. In the northern portion of the subcrop area near Lake Huron, the Amherstburg Formation includes a localized, well-developed, grey, fine-grained, high purity limestone reef complex known as the Formosa Reef Limestone. The Formosa Reef Limestone may become a source for the extraction of high-purity limestone in the near future. The Lucas Formation consists of light brown to grey, bituminous, cherty limestone. Locally, the upper part of the Lucas Formation contains a rock unit known as the Anderdon Member that consists of light to dark grey-brown, fine-grained, high calcium limestone (Johnson et al., 1992). The Anderdon Member limestone quarried in the Beachville-Ingersoll area has a calcium carbonate content between 90-98%.

Producers/Recent Developments

Except for a small amount of production in northern Ontario that utilizes imported materials, the bulk of Ontario's lime industry is situated in the Southwest Ontario District. Within the District, five quarrying operations extract limestone or dolostone for use in the lime, chemical, metallurgical and filler products industries. Some of these and other quarrying operations also sell material for aglime, aggregate, landscaping and engineering uses. Beachville Lime Ltd. and Ingersoll Lime Ltd. produce high-calcium lime from the Devonian Lucas Formation. Dundas Lime Ltd. and Guelph Lime Ltd. produce dolomitic lime from the Silurian Guelph Formation, and E.C. King Contracting extracts glass-grade dolomitic lime from the Silurian Amabel Formation. Dundas Lime purchases rock from the adjacent Dundas Quarry of Lafarge Canada Inc.

A major development in the industry in 1999, was the consolidation of Ontario's four largest operations within the Carmeuse North America Group (CNAG). In February 1999, the joint venture was completed between Carmeuse North America (Guelph DoLime Ltd. and BeachviLime Ltd.) and Lafarge Lime (Dundas Plant). In June 1999, Oglebay Norton sold Global Stone Ingersoll Ltd. to Carmeuse North America for $46.5 million (US). At the end of this consolidation process, each of the operations received corporate name changes to Guelph Lime Ltd., Beachville Lime Ltd., Dundas Lime Ltd. and Ingersoll Lime Ltd. CNAG has designated the Beachville facility as the base load for its northern region that consists of four operations in Ontario and two plants in Michigan. The Beachville plants have subsequently been modified and upgraded to ensure operation at fully capacity. There has been a corresponding reduction in operations at the nearby Ingersoll site.

This consolidation is part of a North American trend with the lime industry wherein European companies are establishing major positions. Increasing competitive forces are driving new methods and business structures to achieve profitability and effectively serve the increasing demands of customers. Regional consolidations like that in Ontario help improve transportation logistics and deliver cost saving synergies.

General Chemical Canada Inc. operates a chemical plant at Amherstburg, south of Windsor. The company's nearby McGregor Quarry produces chemical grade limestone from the Lucas Formation. However in 1999, General Chemical imported limestone from Michigan to feed the chemical plant.

Dimension/Building Stone

Resource Geology

Some of the operators within the dimension, building and landscape stone industry in the Southwest Ontario District extract materials for interior and exterior home construction, but all supply stone for landscape and/or engineering purposes. The geological units currently being utilized by the industry in ascending stratigraphic order are Precambrian gneiss, Gull River Formation limestone, Whirlpool Formation sandstone, Amabel Formation dolostone, Eramosa dolostone, and Dundee Formation limestone. These geological units meet the right combination of criteria that makes them marketable, including suitable physical properties, good exposure and proximity to markets.

Precambrian gneissic rocks of the Grenville Province's Central Gneiss Belt outcrop in the extreme northeast corner of the Southwest Ontario District, northeast of Orillia in Rama Township.

The Middle Ordovician Gull River Formation, the basal member of the Simcoe Group, outcrops in an approximately 10 km wide belt immediately south of the Precambrian Shield in the Orillia area. The formation is typically limestone but locally may be argillaceous or dolomitic.

The Early Silurian Whirlpool Formation sandstone outcrops along the Niagara Escarpment from the Niagara River north to near Collingwood on Georgian Bay. The formation is a white to light grey or maroon, orthoquartzitic sandstone with a maximum thickness of 9 m.

The Middle Silurian Amabel Formation consists primarily of fine to medium crystalline, white to light grey dolostone. The formation is divided into two members; the lower Lions Head Member which is a tan to light brown, thin bedded, fine crystalline dolostone, and the overlying Wiarton/Colpoy Bay Member which is a light blue-grey, mottled, thick bedded, medium to coarse crystalline dolostone. In the area between Hamilton and Cabot Head there are extensive outcrops of Amabel Formation along the top of and to the west of the Niagara Escarpment up to a distance of 10 km.

As mentioned previously, the Middle Silurian Guelph Formation immediately overlies the Amabel Formation and the Eramosa Member formerly prescribed to the Amabel Formation is now included as the basal unit of the Guelph Formation. The Eramosa Member, a brown, thin-bedded dolostone, outcrops in the Hamilton and Guelph areas of southwest Ontario and in the Wiarton area on the Bruce Peninsula.

The Middle Devonian Dundee Formation underlies an area that stretches from Lake Erie to Lake Huron through the London area as well as an area south of Lake St. Clair and Pelee Island. The Dundee Formation consists of light brown, medium to thick bedded, medium grained limestone.

Producers/Recent Developments

In 1999, 22 quarries in the Southwest Ontario District extracted material for dimension, building and landscape stone uses. A limited number of these quarries also extracted stone that was crushed and used as aggregate. Most quarries are seasonal operations that operate continuously from April through December, during which time they employ a workforce of approximately 460 workers. Approximately 25% of this workforce are retained through the winter to process the quarried stone.

Most stone quarry operators indicated that the demand for stone outstripped supply in 1999, particularly those supplying landscape materials for southern Ontario and the Great Lakes states markets.

The largest concentration of stone producers in the Southwest Ontario District is in the Wiarton area where 12 operations extracted Eramosa Member dolostone during 1999. Owen Sound Ledgerock Ltd., the largest stone quarrying and processing operation in the District with over 65 large format stone cutting machines, cut and polished Eramosa Member material for dimension and building stone uses. They and all other local producers quarry Eramosa material for building stone, landscaping and flag stone markets. Owen Sound Ledgerock Ltd recently supplied 2800 m^2 of large 7.5 cm thick cladding panels of Eramosa 'marble' to Marist College in New York State. The company operates three quarries that supply processing facilities at Owen Sound and Wiarton and in 1999, they added new building to both facilities. Flamboro Quarries Ltd., which operates in the Hamilton area, sold selected beds of Eramosa dolostone into the landscape markets.

Arriscraft International Inc. operated the Adair Marble Quarry just north of Wiarton. Blocks of the Wiarton/Colpoy Bay Member of the Amabel Formation were extracted and either processed on-site or transported to the company's Cambridge plant. In 1999, Adair Marble was used to clad the Korean Embassy in Ottawa.

In the Georgetown-Inglewood area during 1999, three operations extracted white and maroon Whirlpool Formation sandstone for the production of squared and irregularly shaped landscaping stone.

In the Orillia area, Gull River Formation limestone and dolostone were extracted by Speiran Quarries Ltd., Fowler Construction and Stone Cottage Inn Ltd. for sale as building and landscape stone. At the Rama Stone Quarries Ltd. property, gneiss was quarried for landscape stone and crushed for aggregate.

On Pelee Island, at the extreme southern limit of the District, Erie Sand and Gravel extracted Dundee Formation limestone for local engineering and landscape uses.

ADVANCED EXPLORATION & DEVELOPMENT

At least seven projects licensed under the Aggregate Resources Act are at the advanced exploration and/or development stage within the Southwest Ontario District. For reasons of legal privacy and confidentiality surrounding the competitive nature of the industrial minerals industry, the companies and individuals working on these projects and their locations can not be identified. Many of the projects involve building stone; however other commodities are also involved. Projects include applications for new quarry licenses, applications for expansion of existing quarry licenses, and re-activating dormant, currently licensed quarries. It is anticipated that all or most of these projects will be in production in 2000.

The following is an update of a project previously reported in the 1998 Resident Geologist Program Annual Report of Activities (Steele and Stewart, 1999).

Canada Brick – Aldershot West Quarry and Plant

In 1998, development began on Aldershot West Quarry and on the construction of an on-site 150 million units per year brick plant. Canada Brick is investing $51 million to set up the new facility. Preparation of the site involved removing some Queenston shale that was used as feed stock for the Burlington Plant. Site preparation continued during 1999 and by the summer, footings had been poured for the approximately 25 000 m^3 brick plant and building construction was underway. The project is on schedule to produce bricks in the fall of 2000.

EXPLORATION ACTIVITY

As all exploration activity in the Southwest Ontario District occurs on privately held land, there is no requirement for companies or individuals conducting mineral exploration to file reports for assessment credit or contact the Ministry of Northern Development and Mines and/or the District Geologist. Through informal discussions however, staff of the Southwest District Geologist Office are kept apprised of exploration or property acquisition interests for such commodities as: limestone/dolostone/marble, salt, high-quality aggregate, sandstone, high-purity silica, cement, gypsum, high-calcium limestone, copper-zinc, and shale. Numerous companies and individuals contacted the Southwest District Geologist Office throughout 1999 for information and/or advice with respect to exploration areas, commodities, exploration methods, processes for acquiring mineral properties and exploration opportunities. As mentioned previously, confidentiality and private land issues surrounding the competitive and market-driven nature of the industrial minerals industry impedes the disclosure of the identities of companies and individuals exploring in southwest Ontario and/or the locations of their properties.

LAND USE PLANNING ACTIVITY

The District Geologist and District Support Geologist were involved in a number of land use planning initiatives that required Ministry input throughout the year. In a joint project with OGS Sedimentary Geoscience Section that resulted from a request from the Maitland River Conservation Authority (MRCA), District staff constructed a common legend for 17 OGS Quaternary geology maps for the area around and north of London. There was frequent communication with the MRCA to correct and/or interpret geological units as depicted on the OGS maps. The District Geologist provided expertise to the Grand River Conservation Authority for the construction of a bedrock geology map for the Brantford-Hagersville area, as well as advice to the Ausable River Conservation Authority on OGS surficial geology mapping.

The District Geologist, in collaboration with the Senior Manager OGS Sedimentary Geoscience Section, wrote a report for the Niagara Escarpment Commission (NEC) on the geology and physiography of the Escarpment in the vicinity of the Milton Outlier. As a result of this report, the District Geologist was asked by the NEC to participate as an expert witness in an Ontario Municipal Board hearing concerning the future use of lands in the Milton area. Involvement to date has involved providing background information and finalizing an expert witness statement.

In support of land use planning related to Official Plans and Official Plan Amendments, the District Geologist/District Support Geologist provided information packages, including outlined areas of MNDM planning interest, to the Ministry of Municipal Affairs and Housing (MMAH) for the following:

Essex County
Region of Haldimand-Norfolk
Saugeen Township
South Bruce (Albemarle, Amabel townships)
City of Chatham-Kent
Simcoe County
York Region
Durham Region
Perth County
Grey County
Region of Hamilton-Wentworth
Bruce & Kincardine Township
Arran & Elderslie Township
Huron County
Peel Region
City of Toronto
Waterloo County
Huron-Kinloss Township
Wellington County (Maryborough, Peel, West Luther, Arthur townships)
North Bruce (St Edwards, Lindsay, Eastnor townships)
Brant, Greenock & Walkerton Township (Bruce County)
Teeswater-Culross-Mildmay-Carrick Township (Bruce County)

The District Geologist also reviewed and provided comments to MMAH on the following:

Oxford County Official Plan
City of Windsor Official Plan
Zorra Township (Oxford County) Zoning Bylaws
Town of Haldimand Official Plan
Region of Durham Official Plan Amendment
Essex County Official Plan

Other land use planning related activities included: 1) presenting a geological information display at a MMAH planning meeting in Richmond Hill; 2) reviewing reports on two proposed landfill sites; 3) providing comments to the Ministry of Natural Resources on the draft Terms of Reference for the 5-year review of the Niagara Escarpment Plan; and 4) providing comments to MNDM Policy Section on mineral resources on the Thames River Indian Reservation.

RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

The Southwest District Geologist Office, staffed by the District Geologist and the District Support Geologist, operates from the Mines and Minerals Information Centre (MMIC) in Toronto. All files, mineral deposit records and reference materials for southwest Ontario are available for viewing at MMIC. For London-based clients, the Petroleum Resources Laboratory maintains a limited library of OGS publications.

As part of the Resident Geologist Program's promotion of the mining industry of southern Ontario, the District Geologist and District Support Geologist, in co-operation with the Southern Ontario Regional Resident Geologist Office located in Tweed, designed, constructed and staffed the *"Mining in Southern Ontario – A Billion Dollar Business"* display at the annual PDAC Convention in Toronto. The display highlighted the 21 industrial mineral commodities that are currently mined or quarried in southern Ontario from 77 active operations. Revenue from their combined production was approximately $1.5 billion in 1998, representing approximately 30% of Ontario's total

mineral production wealth for the year. The display included recommendations for exploration across southern Ontario. A smaller version of this display was presented by the District Geologist at the Northeast Ontario Mines and Minerals Symposium in Timmins, and by the Regional Resident Geologist at the Northwestern Ontario Mines and Minerals Symposium in Thunder Bay.

In May, the District Geologist and District Support Geologist attended the GAC/MAC meeting in Sudbury. The District Geologist participated in the session "Upper Ordovician Strata of the St. Lawrence Platform: Baseline Correlations, Role of Tectonics and Paleoenvironmental Reconstructions". The District Support Geologist participated in two field trips: "Quaternary Geology of the Sudbury Region" and "Ordovician and Silurian fossils and strata of the Lake Timiskaming outlier".

In June, the District Geologist and District Support Geologist attended the Resident Geologist Program planning meeting held in Tweed. The meeting included a field visit to Aqua Rose Gems & Minerals' Beryl Pit and Rose Quartz Quarry.

The District Geologist attended the annual Regional Resident Geologist/District Geologist meeting and field trip in Red Lake from September 20-22. The District Support Geologist attended the annual Regional and District Support Geologists' meeting and field trip in Thunder Bay from October 4-6.

The importance of the 42 non-aggregate industrial mineral operations to the economy of southwest Ontario was emphasized in a display at the International Plowing Match at Dashwood, Ontario in late September through a co-operative effort between the Toronto and Tweed Resident geologist Program offices. Direct and indirect contact was made with several hundreds of attendees who visited the display. Important contacts were made with staff from industrial mineral producers, planning agencies and MNR.

In October, the District Geologist attended the Eleventh Canadian Conference on Markets for Industrial Minerals in Montreal. A pre-meeting field trip visited JM Asbestos Inc.'s Jeffery Mine at Asbestos, Quebec and Noranda's adjacent Magnola magnesium metal project. Conference presentations highlighted many industrial minerals including chromite, fluorspar, silica, silicon metal, wollastonite, chrysotile, magnesium metal, magnesite, bentonite, dolomite. This annual conference will be held next October in Toronto.

In November, the District Geologist attended the Ontario Petroleum Institute Annual Meeting in Niagara Falls. Presentations of note included "Vertical and Lateral Evaporatic Facies Changes within the Salina Formation" by Simon Haynes and "Lower Silurian Medina Sandstone Play – An overview of key trap types and associated exploration and development strategies" by William Zagorski.

In December, the District Geologist was an invited speaker to the U of T Geology Department. Faculty, students, ROM staff and guests attended a presentation on "The Mining Industry of Southern Ontario – A Billion Dollar Business".

At the request of the Ministry of Finance coordinated through the office of the Senior Manger, MNDM Mines Group, the District Geologist assisted a court case involving the taxation of road salt. The District Geologist surveyed people across the aggregate and industrial minerals industries on how different terms/definitions relative to the road salt industry are used. He provided additional support by contacting industry experts, reviewing an expert witness technical report, and participating in the development of strategy.

The District Geologist co-authored a paper in a CIM Special Volume on the Industrial Minerals Industry of Ontario; sections on salt, gypsum, cement, clay/shale and lime industries were prepared.

Late in the year, the District Geologist created information related to the Southwest District for posting on the Resident Geologist Program web site, which will be available in 2000. The District's homepage will include a map and description of the bedrock geology of the area, recommendations for exploration, and a listing of current mineral

producers and their activities.

The District Geologist supplied OGS management ideas and priorities for OGS projects in southwest Ontario, including areas requiring bedrock mapping/commodities studies, aggregate resources inventory studies, and Quaternary geology mapping.

Late in 1999, work continued on updating mineral deposit inventory (MDI) files for the Southwest District. By year end the following files had been updated: Georgia-Pacific/Caledonia Mine No. 3; Georgia-Pacific/Caledonia Mine No. 2; Canada Brick/Aldershot Quarry; George Coultis & Sons Ltd/Thedford Quarry; BeachviLime Ltd/Beachville West Quarry; BeachviLime Ltd/Beachville East Quarry; Global Stone Ingersoll Quarry: and Lafarge Woodstock Quarry.

The District Geologist attended a number of CIM-Toronto Branch and Toronto Geological Discussion Group presentations in 1999, including a TGDG meeting highlighting nickel-platinum deposits and exploration in North America where three of the four presentations focused on Ontario projects.

Public Education

The Southwest Ontario District is home to approximately 75% of Ontario residents. To service the general interest inquiries from the approximately 8 million District residents, staff of the Southwest District Geologist Office participate in a limited number of public education projects.

In promotion of the mining industry of Ontario, the District Geologist's participation in Ontario Mining Weekend at the Royal Ontario Museum included supplying displays on Mining in Southern Ontario, Geology of Toronto, Ontario Gold, and Ontario Amethyst.

The District Geologist supplied information to Toronto Stock Exchange for a permanent mining display in their public information exhibit area. The District Support Geologist helped source graphic materials for the new INCO Earth Sciences Gallery at the Royal Ontario Museum.

The District Geologist is an active member of the PDAC Education Committee. This group's major project is the PDAC Mining Matters which involves the building of teaching kits designed for the grade 4 and 7 levels that illustrate the importance of minerals, rocks, metals and mining in today's society. As part of the PDAC Mining Matters project, the District Geologist helped organize and attended the Junior Miner of the Year presentation by the Minister of Northern Development and Mines in Coboconk. Staff assisted the PDAC Mining Matters project by selecting airphotos for use in the new grade 4 teaching kits. The District Support Geologist assembled and provided a grade 7 teacher's kit to Dr. David Pearson of Laurentian University for the GAC/MAC teachers' workshop.

In 1999, PDAC Mining Matters developed a new grade 4 teaching unit. The construction of over 2000 classroom kits included the collection of approximately 114,000 mineral and rock samples. The District Geologist arranged for the purchase of Ontario Amethyst samples and the donation of salt samples from The Canadian Salt Company Limited. The District Geologist and summer office staff arranged for the donation and collection of quartzite, gypsum, sandstone, marble, magnetite, slate, limestone, quartz, shale and granite samples from Unimin Canada Inc., Georgia-Pacific Canada Inc., Rice and McHarg Quarries, Specialty Aggregates Corp., BeachviLime Ltd., Aqua Rose Gem and Minerals, and Canada Brick. In addition, summer office staff helped PDAC Mining Matters staff move samples between work sites in the Toronto area.

The District Geologist is co-leading a partnership project entitled Geoscape Toronto that is designed to highlight the interaction of geology, landscape, earth and water resources, and people within the Greater Toronto Area. Geoscape Toronto will produce a poster, to be printed in early 2001, for students, teachers, politicians, and the public. The partnership project includes representatives from OGS, Geological Survey of Canada, PDAC, University of Toronto, Royal Ontario Museum, Ministry of Municipal Affairs and Housing, and the private sector. A brainstorming session

in April brought 23 interested participants together from a variety backgrounds, including teachers, lawyers, planners, reporters, and hydrogeologists to discuss potential themes and topics. For more information on Geoscape Toronto the reader is invited to visit our web site at www.toronto.geoscape.org.

The District Geologist made a limited number of in school presentations. Ten classes at the grade 3-4 level got a chance to learn first hand about mineral and rock samples as part of "Minerals in Your Life" presentations.

PROPERTY EXAMINATIONS

The incumbent Southwest Ontario District Geologist was appointed in 1997. Since that time the focus in Southwest Ontario District has been to become familiar with all mineral industry players and their operations within the District by making introductory visits to all active industrial mineral operations and aggregate quarries. There are over 40 industrial mineral operations and approximately 40 aggregate quarries active in Southwest Ontario.

During 1999, the District Geologist made contact with almost all industrial mineral producers and visited 13 of their extraction and processing sites (see Table 3). In total, 33 site visits were conducted throughout the year. As listed in Table 3, detailed visits were made to sites 1 through 9, introductory or short visits were made to sites 10 through 21, geological sites 22 to 28 were visited for their scientific and/or economic significance, and sites 29 through 33 located in the Southeast Ontario District were also visited. Site visits provided information on commodities, mineral deposits, local and regional geology, extraction techniques, processing, products, markets, production and economic statistics, and issues.

The District Geologist was provided a comprehensive geology tour at Georgia-Pacific Canada Inc.'s Caledonia No. 3 Mine. This gypsum mine is the only mining operation in Ontario using continuous mining machines. With this tour, all four underground mines in the Southwest District have been visited within the last two years. During the year the District Geologist was also provided detailed tours of the following operations: 1) Beachville Lime Ltd.'s active quarry and two plants; 2) Canada Brick's Aldershot West and Burlington Quarries, the construction site of their new Aldershot Brick Plant, and one of their Burlington Brick Plants; 3) Sifto Canada Inc.'s Goderich Brine Field and Evaporator Plant; and 4) George Coultis and Son Ltd.'s Thedford Quarry. An introductory visit was made to the PPG Canada Inc.'s float glass plant in Owen Sound. This plant is a major consumer of Ontario industrial minerals including dolostone (Owen Sound), silica (Badgeley Island), nepheline syenite (Blue Mountain), soda ash (Amherstburg) and salt.

The only OPAP project within the Southwest Ontario District was visited on two occasions. The drilling project in Wellington County was testing Silurian age carbonate units for base metals, particularly zinc and copper.

The District Geologist visited the stone yard of John Eisen Ltd. Specialty Landscape Products near Fergus, Ontario. Eisen's distribute material from many Ontario quarry operations including Belmont Rose Granite, Rideauview Contractors, Jarvis Resources, Owen Sound Ledgerock, Tweed Marble, Ebel Quarries, Upper Canada Stone, Stoklosar, plus stock Ontario amethyst. Discussions were held, and information supplied, on opportunities to expand the market for Ontario stone.

Quarry, property and site visits are all part of an on-going program to document known mineral deposits and occurrences, and identify areas of high mineral potential. Site visits also provide useful information for application to land use planning processes.

RECOMMENDATIONS FOR EXPLORATION

Landscape and Dimension Stone

The home construction boom in southern Ontario and surrounding Great Lakes region has expanded markets for landscape and dimension stone.

There is strong demand for **Eramosa limestone/marble** for the residential decorating and landscaping market. The Eramosa Member of the Guelph Formation is currently extracted from 12 quarries near Wiarton, Ontario. Many of these quarries have operated for decades and now have limited reserves. In order to maintain future supply, new exploration and testing for suitable units of Eramosa is recommended.

The Eramosa Member of the Guelph Formation is a thin-bedded dolostone that has been quarried on the Bruce Peninsula since the early 1900's for a variety of building and landscaping stone products. The strong demand from the residential construction industry in southern Ontario presently outstrips supply. The market for Eramosa dolostone is growing, particularly in the Great Lakes region of the United States.

In the late 1980's the OGS completed a mapping project on the stratigraphy and resource potential of the Eramosa Member on the Bruce Peninsula (OGS-Open File Report 5662, 1988). The report presents a description of the lithology of the Eramosa Member, a discussion of the stratigraphic relationships both within the Member and with respect to its bounding formations, comments on its regional distribution, and aspects of its resource potential as a building stone. As a follow-up project, the OGS did detailed mapping of the Paleozoic Geology of the Bruce Peninsula (OGS-Open File Map 198, 1992; OGS-Open File Report 5846, 1993; OGS-Open File Report 5875, 1993). These references should be considered as primary reference materials in exploration for Eramosa Member dolostone.

Access to markets, thin drift cover and varied geology make the area east of Orillia, Ontario, a prime region for developing landscape and dimension stone quarries from at or near surface **limestone and gneiss** sources. The Greater Toronto Area market is within a 2-hours trucking distance.

Industrial Minerals

Large resources of **salt, gypsum,** brick quality **shale,** and high-purity and cement grade **limestone** have been identified in southwest Ontario. All of these commodities are currently in production. New deposits await development as market and economic conditions warrant. Some resources are at or near surface while others would require significant infrastructure to access the deposits at depth. All are near major transportation systems, including port facilities, to access southern Ontario and Great Lakes region markets.

Guelph Formation Dolostone

The Guelph Formation is well known as a resource for the production of high-purity dolomite and calcined products for use in the iron and steel industry. Additional potential uses of high-purity dolomite include the production of magnesium metal, chemicals, plastics, rubber and refractories. The bank reef complex and inter-reef depositional environments within the Guelph Formation form good targets for very high-purity dolomite deposits. Analyses of Guelph Formation drill core indicate intervals of extremely pure, nearly 100% dolomite (21.8% MgO). Areas of potential include the northern Bruce Peninsula, Beachville-Ingersoll, and Owen Sound to Woodstock. Dolomite prospects are listed in Table 6 (Kelly, 1996; Feenstra and Smith 1997; Feenstra and Wilson 1996; Feenstra, Wilson and Tanglis 1995).

Sylvania Formation Silica Sand

Prospects of highly quartzose and friable sandstone of the Sylvania Formation occur at the base of the Detroit River Group below the Amherstburg Formation. Unprocessed, raw Sylvania sandstone grades at about 94% SiO_2, whereas the silica content of washed material may reach 98-99.5% SiO_2. Silica sand prospects are listed in Table 6 (Feenstra and Smith 1997).

OGS ACTIVITIES AND RESEARCH BY OTHERS

Table 4 lists new OGS and Geological Survey of Canada (GSC) publications on southwest Ontario released in 1999.

The OGS did not conduct any field projects within the Southwest Ontario District in 1999, however, Paleozoic geology, Quaternary geology and Aggregate Resources Inventory Paper reports and/or maps from work in previous years were released.

As part of a NATMAP Program, the GSC initiated an Oak Ridges Moraine hydrogeology study in 1993 in response to water and environmental management issues identified by the Ontario Government. The GSC released two additional publications from this project in 1999.

A.P. Hamblin of the GSC continues a study of the Paleozoic rocks of southern Ontario through publishing two literature summary reports in 1999.

Tukasz Skublicki, a Ph.D. candidate at the U of Saskatchewan, is researching the sedimentology and paleoenvironment of the Amabel Formation between Clappison Corners and the Acton Quarry.

REFERENCES

Armstrong, D.K. 1993a. Paleozoic Geology of the Central Bruce Peninsula; Ontario Geological Survey, Open File Report 5856, 19p.

Armstrong, D.K. 1993b. Paleozoic geology of Southern Bruce Peninsula, Southern Ontario; Ontario Geological Survey, Open File report 5875, 19p.

Armstrong, D.K. and Dubord, M.P. 1992. Paleozoic Geology, Northern Bruce Peninsula, Southern Ontario; Ontario Geological Survey, Open File Map 198, scale 1:50 000.

Armstrong, D.K. and Goodman, W.R. 1990. Stratigraphy and Depositional Environments of Niagaran Carbonates, Bruce Peninsula, Ontario; Field trip No. 4 Guidebook, American Association of Petroleum Geologists, Eastern Section 1990 Annual Meeting hosted by Ontario Petroleum Institute, London, Ontario, 59p.

Armstrong, D.K. and Meadows, J.R. 1988. Stratigraphy and Resource Potential of the Eramosa Member, Bruce Peninsula, Ontario; Ontario geological Survey, Open File report 5662, 90p., and 1 map in back pocket.

Derry, Michener, Booth and Wahl and Ontario Geological Survey, 1989: Limestone Industries of Ontario, Volumes I-III, Ministry of Natural Resources and Ministry of Northern Development and Mines, 529p.

Feenstra, B.H. and Smith, Patrica 1997. Southwestern Resident Geologist's District; *in* Report of Activities 1996, Resident Geologists, Ontario Geological Survey, Open File Report 5958, p. 13-1 – 13-9.

Feenstra, B. H. and Wilson, A. C. 1996. Southwestern Resident Geologist's District; *in* Report of Activities 1995, Resident Geologists, Ontario Geological Survey, Open File Report 5943, p. 377-385.

Feenstra, B. H., Wilson, A. C. and Tanglis, C. 1995. Southwestern Resident Geologist's District; *in* Report of Activities 1994, Resident Geologists, Ontario Geological Survey, Open File Report 5921, p. 303-311.

Guillet, G.R., 1964: Gypsum in Ontario, Ontario Department of Mines, Industrial Minerals Report 18, 126p.

Guillet, G.R. and Joyce, I.H., 1987: The Clay and Shale Industries of Ontario, Ontario Ministry of Natural Resources, 157p.

Hains Technology Associates and Bezys, R.K., 1990: Gypsum in Northern Ontario: Resources and Market Potential, Ontario Ministry of Northern Development and Mines, Industrial Minerals Background Paper 12, 56p.

Haynes, S.J. and Hughes-Pearl, J. 1990a: Gypsum deposits and stratigraphy of the Salina A and B Units, Algonquin Arch – Niagara Peninsula, southwestern Ontario, Field Trip No. 4 Guidebook, American Association of Petroleum Geologists, 1990 Eastern Section Meeting hosted by the Ontario Petroleum Institute, London, Ontario, 31p.

Haynes, S.J. and Hughes-Pearl, J. 1990b: Gypsum deposits of Southern Ontario, *in* Geoscience Research Grant Program, Summary of Research 1989-1990, Ontario Geological Survey, Miscellaneous Paper 150, p. 27-36.

Johnson, M.D., Armstrong, A.K., Sanford, B.V., Telford, P.G. and Rutka, M.A., 1992: Paleozoic and Mesozoic Geology of Ontario, *in* Geology of Ontario, Ontario Geological Survey, Special Volume 2, part 2, p. 907-1008.

Kelly, R.I., 1996: High-Purity Calcite and Dolomite Resources in Ontario, Ontario Geological Survey, Open File Report 5954, 39p.

Steele, K.G. and Stewart, J.M., 1999: Southwest Ontario District-1998, *in* Report of Activities, 1998, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report, Ontario Geological Survey, Open File report 5992, 76p.

Figure 1. Producing Mines and Quarries – Southwest Ontario District, 1999

•	**Producing Mines**	
	1. Sifto Canada Inc., Goderich Mine, Goderich	rock salt
	2. The Canadian Salt Company Ltd., Ojibway Mine, Windsor	rock salt
	3. Georgia Pacific Canada Inc., Caledonia No. 3 Mine, Caledonia	gypsum
	4. CGC Inc., Hagersville Mine, Hagersville	gypsum
•	**Producing Quarries – Cement**	
	5. Lafarge Canada Inc., Woodstock Quarry, Zorra Tp.	limestone
	6. Blue Circle Cement, St. Marys Quarry, Blanshard Tp.	limestone
	7. Blue Circle Cement, Bowmanville Quarry, Darlington Tp.	limestone
	8. St. Lawrence Cement Inc. Mississauga Quarry, Mississauga	shale
•	**Producing Quarries – Brick Products**	
	9. Brampton Brick Ltd., Cheltenham Quarry, Cinguacousy Tp.	shale
	10. Canada Brick, Streetsville Quarry, Mississauga	shale
	11. Canada Brick, Milton Quarry, Esquesing Tp.	shale
	12. Canada Brick, Burlington Quarry, Burlington	shale
	13. Canada Brick, Aldershot Quarry, Burlington	shale
	14. George Coultis and Son Ltd., Thedford Quarry, Bosanquet Tp.	shale
	15. A. C. Martin Ltd., Georgetown Quarry, Esquesing Tp.	shale
•	**Producing Quarries – Chemical, Metallurgical, & Filler Stone Products**	
	16. Ingersoll Lime Ltd., Ingersoll Quarry, Zorra Tp.	limestone
	17. Beachville Lime Ltd., Beachville West Quarry, Zorra Tp.	limestone
	18. Guelph Lime Ltd., Guelph Quarry, Guelph	dolomite
	19. E. C. King Contracting Ltd., Sydenham Quarry, Sydenham Tp.	dolomite
	20. Lafarge Canada Inc., Dundas Quarry, West Flamborough Tp.	dolomite
•	**Producing Quarries – Dimension, Building , Landscape Stone**	
	21. Arriscraft International Inc., Adair Marble Quarries, Albemarle Tp.	dolostone
	22. Owen Sound Ledgerock Ltd., Senesun Quarry, Amabel Tp.	dolostone
	23. Owen Sound Ledgerock Ltd., Wiarton Quarry, Amabel Tp.	dolostone
	24. Owen Sound Ledgerock Ltd., Owen Sound Quarry, Keppel Tp.	dolostone
	25. Ebel Quarries Inc., Ebel Quarry, Amabel Tp.	dolostone
	26. Bruce Peninsula Stone, Mar Quarry, Albemarle Tp.	dolostone
	27. Amsen Quarries Ltd., Mar Quarry, Albemarle Tp.	dolostone
	28. Amsen Quarries Ltd., Wiarton Quarry, Amabel Tp.	dolostone
	29. Suad Natural Stone Contracting, Suad Natural Stone Quarry, Amabel Tp.	dolostone
	30. Speiran Quarries Ltd., Speiran Quarry, Ramara Tp.	limestone
	31. Deforest Brothers Quarry Ltd., Deforest Brothers Quarry, Caledon Tp.	sandstone
	32. Hilltop Stone and Supply Inc., Hilltop Quarry, Esquesing Tp.	sandstone
	33. Rice and McHarg Ltd., Rice and McHarg Quarry, Esquesing Tp.	sandstone
	34. Georgian Bay Marble and Stone, Wiarton Quarry, Amabel Tp.	dolostone
	35. Georgian Bay Marble and Stone, Cook Quarry, Amabel Tp.	dolostone
	36. Flamboro Quarries Ltd., Flamboro Quarry, West Flamboro Tp.	dolostone
	37. A & A Natural Stone Ltd., A & A Quarry, Keppel Tp.	dolostone
	38. Fowler Construction Company Ltd., Woods Quarry, Ramara Tp.	limestone
	39. Rama Stone Quarries Ltd., Fleming Quarry, Ramara Tp.	gneiss
	40. Wiarton Stone Quarry Inc., Wiarton Stone Quarry, Amabel Tp.	dolostone
	41. Stone Cottage Inn Ltd., Attia Quarry, Ramara Tp.	dolostone
	42. Erie Sand and Gravel, Pelee Island Quarry	limestone
•	**Producing Brine Well Fields - Salt**	
	43. Sifto Canada Inc., Goderich Brine Field, Goderich	salt in brine
	44. The Canadian Salt Company Ltd., Windsor Brine Field, Windsor	salt in brine
	45. General Chemical Canada Ltd., Anderdon Brine Field, Anderdon Tp.	salt in brine

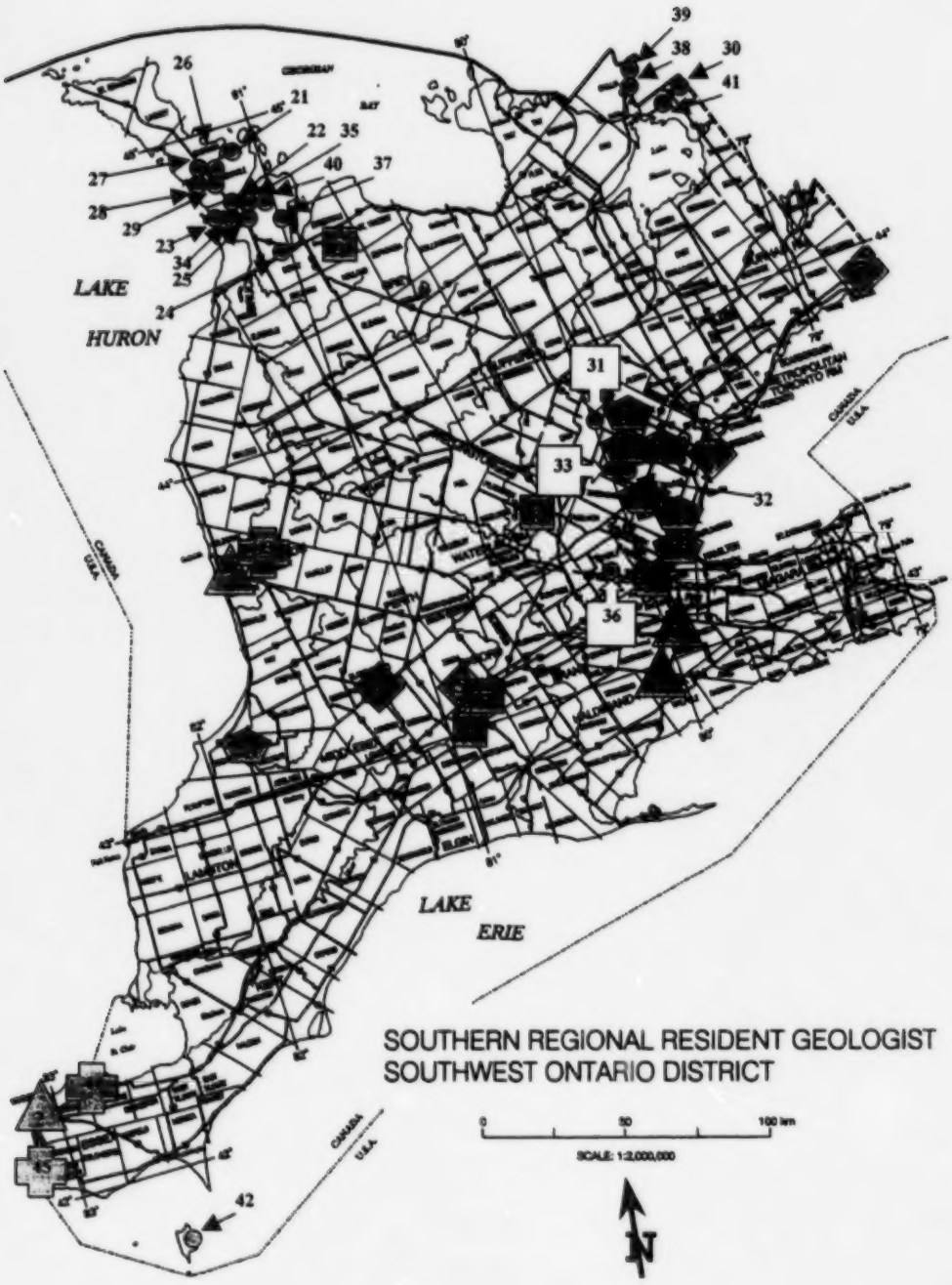
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Figure 2. Property visits in Southwest Ontario District in 1999

	Property	Commodity
1	Owen Sound Ledgerock Ltd. – Owen Sound processing plant	Dolostone/marble, dimension stone, landscape stone, flagstone
2	Georgia-Pacific Canada Inc. – Caledonia No. 3 Mine	Gypsum
3	Beachville Lime Ltd. – West Quarry and east & west processing plants	Lime, dolime, hydrate lime, pulverized stone
4	Canada Brick – Aldershot West Quarry and new plant under construction	Shale, brick
5	Sifto Canada Inc. – Goderich Brine Field & Evaporator Plant	Salt
6	George Coultis & Son Ltd. – Thedford Quarry	Shale
7	Canada Brick – Burlington Quarry & Brick Plant	Shale, brick
8	OPAP project drill site	Copper, zinc
9	John Eisen Ltd. Specialty Landscape Products	Landscape stone
10	E.C. King Contracting – Sydenham Quarry and Owen Sound office	Dolomite
11	PPG Canada Inc. – Owen Sound glass plant	Glass
12	Blue Circle Cement - Bowmanville	Cement
13	Credit Valley Quarries Co. Ltd. – Terra Cotta property	Sandstone
14	Unimin Canada Ltd. – Midland silica processing plant	Silica
15	Canada Brick – Milton Quarry	Shale
16	Hungry Hollow South Quarry	Shale
17	Hungry Hollow North Quarry	Shale
18	Blue Circle Cement – St. Mary's	Cement
19	Lafarge Canada Inc. – Queenston Quarry	Limestone, aggregate, dimension stone
20	Canada Brick – Niagara on the Lake property	Shale
21	Rice and McHarg Ltd. – Rice and McHarg Quarry	Sandstone
22	Rock Glen – Arkona	Fossils
23	Lake Huron Dunes – Port Franks	Scientific Interest
24	Kettle Point	Scientific Interest
25	Fonthill Kame	Aggregate
26	Onondaga Escarpment - Port Colborne	Limestone
27	Niagara Escarpment - Milton	Dolostone, shale
28	Wyoming Moraine	Scientific Interest

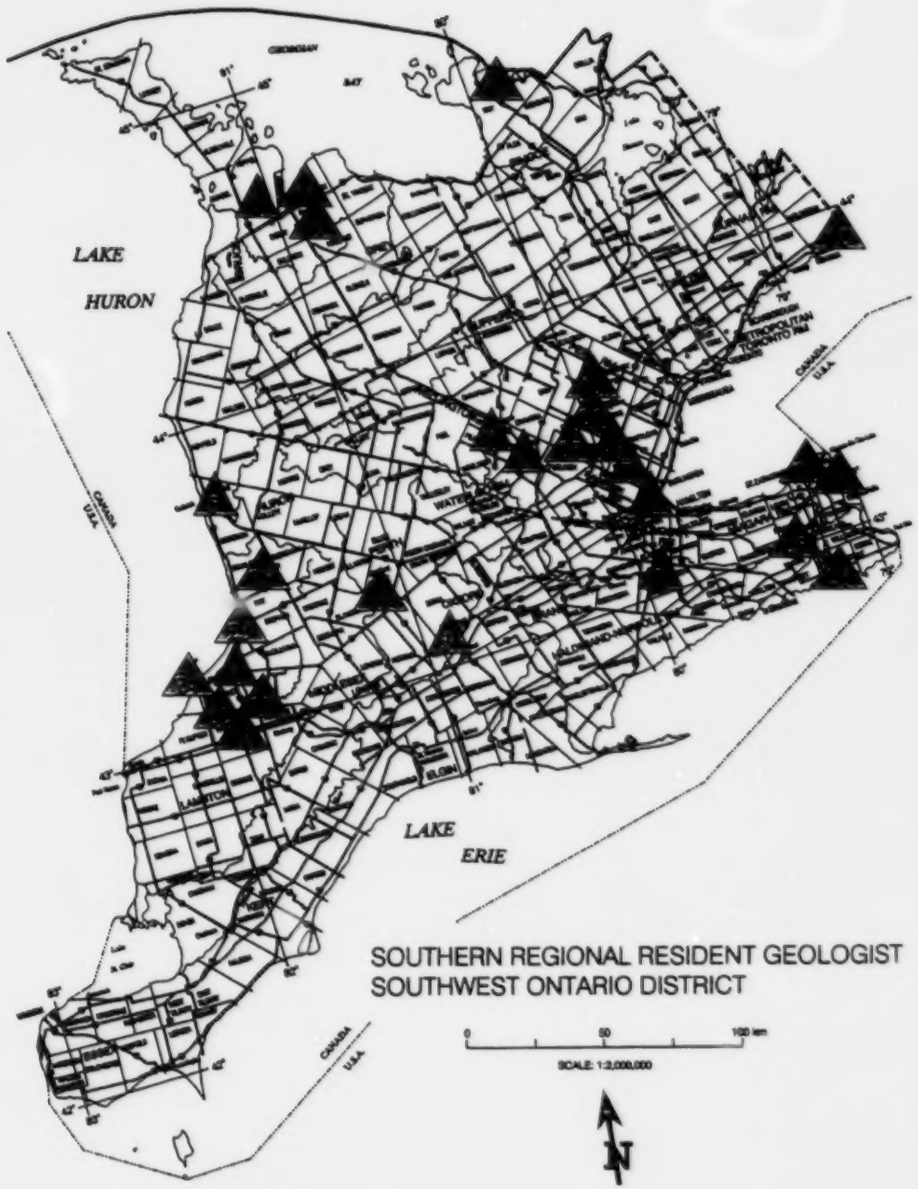

Table 1. Selected Industrial Mineral Production in Ontario

	1996	1996	1997	1997	1998	1998
NON-METALS	**Quantity (000 tonnes)**	**Value (000 $)**	**Quantity (000 tonnes)**	**Value (000 $)**	**Quantity (000 tonnes)**	**Value (000 $)**
Gypsum	1 007	12 247	1 046 (*1 075)	14 171	992 (*1 080)	13 521
Salt	8 402	256 156	8 968 (*9 740)	275 229	8 315 (*9 650)	257 856
Total all non-metals		**363 080**		**399 329**		**383 839**
STRUCTURAL MATERIALS	**Quantity (000 tonnes)**	**Value (000 $)**	**Quantity (000 tonnes)**	**Value (000 $)**	**Quantity (000 tonnes)**	**Value (000 $)**
Clay products		76 200		102 713		101 602
Cement	5 212	384 570	5 248	446 497	5 425	477 265
Lime	1 317	103 535	1 344	108 884	1 332	108 793
Sand and Gravel	86 571	321 079	90 515	337 137	91 308	342 559
Stone	39 620	267 710	44 839	299 792	45 304	307 677
Total all structural materials		**1 153 094**		**1 295 023**		**1 337 897**
FUELS	**Quantity (000 m^3)**	**Value (000 $)**	**Quantity (000 m^3)**	**Value (000 $)**	**Quantity (000 m^3)**	**Value (000 $)**
Natural gas	307 000	31 188	270 000	37 686	277 000	39 009
Petroleum	268	49 562	227	41 136	217	26 720
Total		**80 750**		**78 822**		**65 729**
Total all Industrial Minerals		**1 516 174**		**1 694 352**		**1 721 736**
Total all Minerals		**5 710 028**		**5 614 963**		**5 059 466**
Industrial mineral % of total mineral		**26.6**		**30.2**		**34.0**

after Ontario Mineral and Exploration Statistics 1998 ; MNDM, 1999
**Production as reported by companies to the District Geologist.*

Table 2. Mine Production and Reserves in the Southwest Ontario District

Mine	Production in 1999 Tonnage @ Grade	Production in 1998 Tonnage @ Grade	Reserves at end of 1999 Tonnage	Grade
Caledonia No. 3 Mine	418 000 t @ 75-80% gypsum/t	400 000 t @ 70-75% gypsum/t	40 000 000 t	70-75% gypsum/t
Hagersville Mine	725 000 t @ 85% gypsum/t	680 000 t @ 85% gypsum/t	13 000 000 t	85% gypsum/t
Goderich Mine	4 750 000 t @ 97% NaCl/t	6 000 000 t @ 97% NaCl/t	350 000 000 t	97% NaCl/t
Ojibway Mine	2 436 000 t @ 97% NaCl/t	2 500 000 t @ 97% NaCl/t	92 600 000 t	97% NaCl/t

t = tonne

Table 3. Property visits conducted by the Southwest Ontario District Geologist in 1999

Number	Property/Occurrence/Plant/Geological Site
1	Owen Sound Ledgerock Ltd. – Owen Sound processing plant
2	Georgia-Pacific Canada Inc. – Caledonia No. 3 Mine
3	Beachville Lime Ltd. – West Quarry and east & west processing plants
4	Canada Brick – Aldershot West Quarry and new plant under construction
5	Sifto Canada Inc. – Goderich Brine Field & Evaporator Plant
6	George Coultis & Son Ltd. – Thedford Quarry
7	Canada Brick – Burlington Quarry & Brick Plant
8	OPAP project drill site – base metal prospect
9	John Eisen Ltd. Specialty Landscape Products
10	E.C. King Contracting – Sydenham Quarry and Owen Sound office
11	PPG Canada Inc. – Owen Sound glass plant
12	Blue Circle Cement – Bowmanville
13	Credit Valley Quarries Co. Ltd. – Terra Cotta property
14	Unimin Canada Ltd. – Midland silica processing plant
15	Canada Brick – Milton Quarry
16	Hungry Hollow South Quarry
17	Hungry Hollow North Quarry
18	Blue Circle Cement – St. Marys
19	Lafarge Canada Inc. – Queenston Quarry
20	Canada Brick – Niagara on the Lake property
21	Rice and McHarg Ltd. – Rice and McHarg Quarry
22	Rock Glen – Arkona
23	Lake Huron Dunes – Port Franks
24	Kettle Point
25	Fonthill Kame
26	Onondaga Escarpment - Port Colborne
27	Niagara Escarpment – Milton
28	Wyoming Moraine
29	Princess Sodalite Mine Rock Shop – Bancroft
30	ESSROC Canada Inc. – Picton Quarry and Cement Plant
31	Aqua Rose Gem and Minerals – Quadeville
32	Specialty Aggregates Corp. – Madoc
33	Bancroft & District Chamber of Commerce

Table 4. New Ontario Geological Survey (OGS) and Geological Survey of Canada (GSC) Publications on Southwest Ontario Released in 1999.

Title	Author	Type and Year of Publication
Results of Paleozoic Bedrock Drilling Project, Northern Lake Simcoe Area, South-Central Ontario	Armstrong, D.K.	OGS Open File Report 5999, 1999
Summary of Field Work and Other Activities, 1998	Ayer, J.A., Baker, C.L., Ireland, J.C., Kelly, R.I., and Thurston, P.C. (eds.)	OGS Miscellaneous Paper 169, 1999
Quaternary Geology of the Newmarket Area	Barnett, P.J., Dodge, J.E.P., McCrae, M.K., and Stuart, A.	OGS Map 2562, scale 1:50 000, 1999
Middle Devonian (Givetian, Hamilton Group) ostracoda in two diamond drill cores from Lambton County, southwestern Ontario	Copeland, M.J.	GSC Bulletin 537, 1999
Regional groundwater and stream chemistry survey, Oak Ridges Moraine, Ontario	Dyke, L.	GSC Current Research 1999-E, 1999
Lower Silurian Medina Group of Southwest Ontario: summary of literature and concepts	Hamblin, A.P.	GSC Open File 3468, 1999
Upper Ordovician strata of Southwest Ontario: synthesis of literature and concepts	Hamblin, A.P.	GSC Open File 3729, 1999
A Landsat thematic mapper mosaic of the Oak Ridges Moraine and the Greater Toronto area of southern Ontario (parts of NTS 30M; 31C, D; 40P)	Kenny, F.M.	GSC Open File 3646, 1999
Aggregate Resources Inventory of the Regional Municipality of Durham: Townships of Brock, Uxbridge, Scugog; the Municipality of Clarington; the Towns of Pickering, Ajax and Whitby and the City of Oshawa	OGS and MacNaughton Hermsen Pritton Clarkson Planning Limited	OGS Aggregate Resources Inventory Paper 166, 57p., 1999
Aggregate Resources Inventory of Wellington County: Townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph	OGS and Planning & Engineering Initiatives Limited	OGS Aggregate Resources Inventory Paper 162, 73p., 1999
Report of Activities 1998, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeast and Southwest Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Stewart, J.M., and Carter, T.R.	OGS Open File Report 5992, 1999
Regional geological mapping of the Oak Ridges Moraine, Greater Toronto Area, southern Ontario	Sharpe, D.R., Barnett, P.J., Russell, H.A.J., Brennand, T.A., and Gorrell, G.	GSC Current Research 1999-E, 1999
Wellbore temperature measurements and preliminary interpretation in terms of groundwater movement in the Oak Ridges Moraine, Ontario	Taylor, A., Allen, V., Burgess, M., and Naufal, J.	GSC Open File 3787, 1999

Table 5. Selected Publications Received in 1999 by Southwest Ontario District Geology Office (Mines and Minerals Information Centre) of particular reference to Southwest Ontario.

Title	Author	Type and Year of Publication
Sedimentology, Stratigraphy, and Ichnology of the Lower Silurian Medina Formation in New York and Ontario	Duke, W.L. (ed.), Brusse, W.C., Fawcett, P.J., Middleton, G.V., Rutka, M.A., Salas, C.J., and Pemberton, S.G.	Society of Economic Paleontologists and Mineralogists Eastern Section, 1987 Annual Field Trip Guidebook, 1987
Sampling Bulk Industrial Minerals and Ores A Practical Approach	Edwards, G.H. and Harben, P.W.	Industrial Minerals Information Limited, Surrey, UK, 1999
The Industrial Minerals HandyBook Third Edition	Harben, P.W.	Industrial Minerals Information Limited, Surrey, UK, 1999
Hydrogeologic Evaluation of the Oak Ridges Moraine Area: GTA Portion "Background Report No. 3 to the Oak Ridges Moraine Area Planning Study"	Hunter and Associates with Raven Beck Environmental Ltd.	*Prepared For* Oak Ridges Moraine Technical Working Committee, 1996
Urban Geology of Canadian Cities	Karrow, P.F. and White, O.L. (eds.)	Geological Association of Canada Special Paper 42, St. John's, Newfoundland, 500p., 1998

Table 6. Mineral Deposits Not Being Mined in the Southwest Ontario District in 1999

Abbreviations

AF ..... Assessment Files
CMH ..... Canadian Mines Handbook
GR ..... Geological Report
MDC ..... Mineral Deposit Circular
MDIR ..... Mineral Deposit Inventory record
MLS ..... Mining Lands, Sudbury
MR ..... Mining Recorder
NM ..... The Northern Miner
OFR ..... Open File Report
PC ..... Personal Communication

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Amherstburg Quarry Silica Prospect (40J/03SE)	Silica	20m thick over 66 ha ($20\text{-}26\times10^6$ t@ 94% SiO_2)	Amherst Quarries (1969) Ltd.	OFR 5861, p. 32 IMR 9, p. 29, 31	Inactive
Big Creek 1 (40J/03SE)	Silica	19.5m thick @ 25m (10×10^6 t of sandstone)	N/A	IMR 9, p. 29	Inactive
Big Creek 1 (40J/03SE)	Silica	14.6m thick @ 34.4m (10×10^6 t of sandstone)	N/A	IMR 9, p. 29	Inactive
Dow-Moore 2-20-12 (40J/16NW)	Salt	21m thick @ 698m 73m thick @ 582m 114m thick @ 410m	N/A	PRW Dow-Moore 2-20-XII	Inactive
Eastnor-Lindsay Prospect (41H/03SW)	Dolomite	60×10^6 t dolomite @ <0.10% impurities ($SiO_2+Fe_2O_3+Al_2O_3$)	N/A	PRW OGS Lindsay 7-III W	Inactive
Imperial Oil No. 560, Sombra 2-12-H, Gormlay No. 1 (40J/090NW)	Salt	32.2m thick @ 612.6m 84.1m thick @ 490.7m 46.9m thick @ 388.6m	N/A	PRW Sombra 2-12-H	Inactive
Imperial Oil No. 597, Logierait No. 1-Y-R, R.C. Fleck No. 2B (40J/16NW)	Salt	29.6m thick @ 680m 87.8m thick @ 544m	N/A	PRW Imperial Oil No. 597B	Inactive
Lindsay Prospect (41H/03SW)	Dolomite	>35×10^6 t dolomite @<0.10% impurities ($SiO_2+Fe_2O_3+Al_2O_3$)	N/A	PRW OGS Lindsay 31-VIII W	Inactive
Patton Farm (40J/03SE)	Silica	5.4m thick @ 10.1m	N/A	IMR 9, p. 29	Inactive

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Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Sunburst GB #7 McGillivray 41-NB (40P/04NE)	Salt	88.7m thick @ 363.6m 5.8m thick @ 339.5m	N/A	PRW Sunburst GB #7	Inactive
Tobermory Prospect (41H/04NE)	Dolomite	$60x10^6$ t dolomite @<0.10 impurities (SiO_2+Fe_2O_3+Al_2O_3)	N/A	PRW OGS St. Edmunds 47-III W	Inactive
Union Gas-Enniskillen No. 29, D.V.L.A. No. 1 (40J/16SW)	Salt	25.6m thick @ 610.8m 78.6m thick @ 485.5m	N/A	PRW Union Gas-Enniskillen No. 29	Inactive
Union Gas-Moore No. 12 P&I Williams No. 1 (40J/16SW)	Salt	26.2m thick @ 577.3m 70.7m thick @ 456.6m	N/A	PRW Union Gas-Moore No. 12- P&I Williams No. 1	Inactive
Union –Moore No. 22 (40J/16SW)	Salt	36m thick @ 580m 32m thick @ 437m	N/A	PRW Union Moore No. 22	Inactive

Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Mines and Minerals Information Centre – 1999

by

W. J. McGuinty and C. R. Lee

2000

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MINES AND MINERALS INFORMATION CENTRE

TORONTO – 1999

W. J. McGuinty[1] and C. R. Lee[2]

[1] Industry Liaison Geologist, Ontario Geological Survey

[2] Regional Support Geologist, Ontario Geological Survey

INTRODUCTION

The Mines and Minerals Information Centre (MMIC) is an advisory, information and sales outlet for the Mines and Minerals Division (MMD), Ministry of Northern Development and Mines (MNDM) designed to serve the mineral exploration and mining/earth science communities and the general public. MMIC offers a wide variety of information and research materials as well as expertise on Ontario's geology, rocks and minerals, mineral industries and related issues. MMIC staff also provide assistance and referral for clients who require information concerning the Ontario Mining Act.

MMIC SERVICES

ERLIS/Geoscience Databases

The Earth Resources and Land Information System (ERLIS) is an electronic archival database of Ontario's geoscience information. ERLIS provides MMIC mineral industry clients with access to datasets that contain the following information:

- mineral exploration assessment work reports filed by mineral industry workers as part of their obligations under the Mining Act to maintain their exploration properties in good standing. Assessment reports may include such information as geological maps, geophysical survey results, drill hole logs and locations, and geochemical and assay data.
- mineral deposit inventory (MDI) records for more than 18,000 mineral occurrences province-wide and their localities; lithological, lithogeochemical and tectonic assemblage data and information for Ontario as compiled by the Ontario Geological Survey and other agencies.

ERLIS offers clients data search, compilation and integration capabilities through 3 workstations located at MMIC. The system can be used for data searches and compilations at no charge. Printed materials in colour or black and white, or digital downloaded products such as maps and text are available at a nominal fee. In addition to ERLIS, most Resident Geologist Program offices around the province have archives of donated geoscience materials that can be accessed via inter-library loan with the assistance of MMIC personnel.

Publication Sales

MMIC serves as a walk-in sales outlet in Toronto for publications produced by the Mines and Minerals Division (MMD), particularly the Ontario Geological Survey (OGS) and its predecessor, the Ontario Bureau of Mines. MMIC maintains a retail stock of over 10,000 different publications, including:

- geological, geophysical, geochemical and aggregate resource maps and reports,
- minerals industry statistics and annual activity reports,
- mineral policy papers,
- industrial mineral and mineral deposit circulars,
- geology guidebooks and posters and
- open file reports

Requests for publications via telephone, mail or e-mail are referred to the Publication Sales Centre in Sudbury for distribution. New MMD publications are generally available at MMIC following their public release date. Limited quantities of Open File Reports are available for sale at the Centre at their release.

Library Services

The MMIC library provides a selection of reference and topical information on earth science and the minerals industry. Directories, science and industry periodicals and journals are available to clients. Table 2 lists current subscriptions to geoscience and mining related newsletters. Table 3 lists the journals and periodical publications added to the MMIC library during 1999.

Texts and other reference materials are acquired for the library by MMIC staff. Table 4 summarizes the reference materials acquired in 1999. Digital reference databases are available for both the MMIC library and the MNDM library in Sudbury. Clients may also request inter-library loans and transfers from other MMD offices.

The MMIC library also maintains and updates the complete collection of OGS publications, dating from 1891, and most publications of the Geological Survey of Canada (GSC), dating from 1863, that relate to Ontario. Table 5 lists the OGS publications received during 1999 and Table 6 lists GSC publications received during the year.

MMIC STAFF AND ACTIVITIES

During 1999, MMIC was staffed and supported by 5 members of the Resident Geologist Program. Ken Steele, Southwestern Ontario District Geologist and Jennifer Stewart, District Support Geologist provided specific assistance and expertise regarding the geology, resources and minerals industry in Southwestern Ontario. Charley Lee, Regional Support Geologist for Southern Ontario, provides lead support for the delivery of ERLIS services and library functions. Inquiry Clerk Jennifer John maintains publication inventories and provides primary reception/front counter client services. Bill McGuinty, Industry Liaison Geologist (ILG), provides assistance to minerals industry clients in accessing geoscience and mineral related policy information and expertise from the Ministry of Northern Development and Mines. In his role as liaison, he serves as a primary contact person for information flow and exchange between the minerals industry, its related client associations and the Ministry regarding new government initiatives or issues that may affect mineral investment and the success of exploration and mining in the Province.

The Ontario Summer Experience Program provided an opportunity for two university students, Tara Middleton and Allan Leung to learn about the operations of the Ontario Geological Survey through working with staff and assisting clients at MMIC.

MMIC staff responded to approximately 4,300 client inquiries during 1999, a significant decrease in the numbers reported for the 1998 calendar year. The client base served by the Southwest District Geologist Office is now reported separately, which primarily accounts for the reduction in these figures.

Although primarily a source of information for mineral industry clients such as geologists, geoscientists, engineering and consulting firms and other government agencies, MMIC clients also include students from elementary to university levels, land use planners and the general public. MMIC staff provided information about prospecting and mineral exploration activities in Ontario, mining and the environment, land use planning issues and requests for earth science educational information in addition to its core geoscience expertise. The following client interaction statistics were recorded in 1999:

Table 1: MMIC Client Service Statistics – 1999

	Walk-in Clients	Telephone Inquiries	Total
General Information and Publication Sales	1470	1828	3298
ERLIS	656	69	725
Library	213	53	266
Total	2339	1950	4289

Industry Liaison Geologist Activities

Government-to-Government Activities

In support to fostering government-to-government relations during the year, the Regional Support Geologist and the District Support Geologist assisted the Industry Liaison Geologist (ILG) in preparing and delivering 3 presentations to visiting foreign mines ministry officials who were on official missions to Canada related to mines and mineral development. Two delegations from the People's Republic of China, from Hubei Province and from the federal Bureau of Mineral Resources were presented with overviews of mining land acquisition and tenure management and of services provided by MNDM to mineral industry clients such as internet access and ERLIS. A similar presentation was provided to a group of mines ministry officials from Ethiopia in conjunction with a training program at a local university. Mr. Don Obonsawin, former Deputy Minister for MNDM, Mr. Ron Gashinski, Senior Manager for Mining Lands and Ken Steele, SW Ontario District Geologist each made presentations at one of these information sessions.

The Industry Liaison Geologist also participated in the MNDM working group supporting the Organizing Committee for the World Mines Ministries Forum, to be held from March 8th to 10th, 2000, as part of the Mining Millenium 2000 Conference. The committee is co-chaired by Dr. John Gammon, Assistant Deputy Minister, MMD. The ILG prepared an application for CIDA funding for the World Mines Ministries Forum Conference, a request for proposal for facilitating the event and contributed to compiling and preparing forum brochures. The ILG also provided support to French and Spanish language translation of published media materials.

In June, the ILG delivered a presentation on aspects of junior mining companies to an audience of Latin

American regulators and mining industry representatives at the **Keys to Success in Latin American Mining Conference** held in Keystone, Colorado and sponsored by the Institute of the Americas. The presentation focussed on defining the junior sector for the audience and describing its role, advantages and limitations in the discovery of mineral deposits and sustainable development in Latin America.

Industry Liaison Activities

The Industry Liaison Geologist provided support to obtaining client input to MNDM initiatives and to MNDM's representation of its clients' concerns in other Ontario government initiatives affecting the minerals industry. Clients from the junior and senior mining sectors, the financial and legal communities and the mining and exploration services sectors were contacted in order to obtain a broad sampling of industry perspective on mining sector issues. The ILG assisted in preparation of, and participated in, client meetings with MNDM management and senior staff investigating the design of effective mineral sector stimulus programs. The ILG also sought and obtained input from the financial community into the implications of the *Ontario's Living Legacy* land use strategy on concerns for financing mineral projects in the new planning areas. Client commentary was also sought regarding changes to rules affecting the regulations for financing mineral exploration and development ventures and changes to stock exchange requirements for mining companies, as well as the evolving effects of new disclosure rules and the registration of professional geoscientists in Ontario.

The Industry Liaison Geologist also gave assistance, on request, to the Minister's Office providing technical expertise or background information on mining industry issues and undertaking research as required.

The Industry Liaison Geologist attended a number of symposia and conferences during the year as a means of delivering information about MNDM activities and initiatives, and to facilitate client contact and interaction in obtaining broad commentary on the industry regarding the state of exploration and development in Ontario and abroad. The following mineral industry events were attended;

- Prospectors and Developers Association of Canada Convention (Toronto)
- Northeastern Ontario Mines and Minerals Symposium (Timmins)
- Northwestern Ontario Mines and Minerals Symposium (Thunder Bay)
- Keys to Success in Latin American Mining Conference (Keystone, Colorado)
- Merrill-Lynch Mining Conference (Toronto)
- Manitoba Mining and Minerals Convention (Winnipeg),
- Northwest Mining Association Annual Meeting and Conference (Spokane, Washington).

Land Use Planning Activities

In support to protecting mineral resource interests, MMIC staff assisted the Southwest District Geologist and District Support Geologist in responding to land use planning initiatives led by the Ministry of Municipal Affairs and Housing (MMAH), the Ontario Native Affairs Secretariat (ONAS) and the Ministry of Natural Resources (MNR). Staff provided commentary on the mineral potential of *Ontario's Living Legacy* sites identified for protection and provided similar input into various Official Plans and Official Plan Amendments.

Updated information regarding the continuing development of *Ontario's Living Legacy* land use strategy was made available to mineral industry clients and the general public at the MMIC throughout 1999. Client concerns relating to the strategy were integrated into the Ministry of Northern Development and Mines ongoing participation in this initiative. Maps and background information for each of the designated protected areas were made available to walk-in clients and Internet information resources were provided

to telephone inquiries.

Education Activities

MMIC Summer Experience students assisted the Southwest District Geologist and the District Support Geologist with collection of materials for the preparation of Deeper and Deeper, an educational product designed by the Prospectors and Developers Association of Canada to assist Ontario public school teachers in delivering the revised earth sciences curriculum.

Many educators in the Ontario public school system, particularly those teaching grades 4 and 7, contacted MMIC for resource materials to assist with geoscience education components of their class design. Approximately 100 kits containing information about Ontario mines and mineral products, geoscience, geology, rocks and minerals were provided on request. Additional sources of earth science information were also provided.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the insights and efforts of the clients of the Mines and Minerals Information Centre who gave their time and expertise in order to contribute to improving services provided by MMIC and other MNDM divisions and to building the broad based knowledge resource required by MNDM to enhance mineral sector competitiveness and ensure the sustainable development of Ontario's mineral resources. The authors also recognize the efforts of Jennifer John, Jennifer Stewart and Ken Steele in supporting MMIC services and activities.

Table 2. Newsletters Received by MMIC Library in 1999

Title
Association of Geoscientists of Ontario - Update
Bearsh't & Blueberries – Northwestern Ontario Prospectors Association
CANQUA Newsletter – Canadian Quaternary Association
Explore – Newsletter for the Association of Exploration Geochemists
GAC – Environmental Earth Sciences Division Newsletter
GEOLOG – News Magazine of the Geological Association of Canada
ICME – International Council on Metals and the Environment
Mineralogical Association of Canada Newsletter
Mining Matters (and) Mining in Ontario – Ontario Mining Association
PDAC in Brief – Prospectors and Developers Association of Canada - Activities and Canadian Exploration News
The Explorationist – Newsletter of the Ontario Prospectors Association
The Gangue – GAC Mineral Deposits Division Newsletter
The Week in Geology - News and Happenings – University of Toronto Department of Geology
Wat on Earth – University of Waterloo Department of Earth Sciences

Table 3. Journals received by MMIC Library in 1999

Title
Canadian Aggregates and Roadbuilding Contractor
Canadian Journal of Earth Sciences
Canadian Mining Journal
Canadian Institute of Mining and Metallurgical Bulletin
Economic Geology – Bulletin of the Society of Economic Geologists
Engineering and Mining Journal
Exploration and Mining Geology – Journal of the Geological Society of CIM
Géographie Physique et Quaternaire
Geoscience Canada
George Cross News Letter
Geotimes – News and Trends in Geoscience
Heavy Construction News Industrial Minerals
Journal of Geochemical Exploration – Journal of the Association of Exploration Geochemists
Kaiser Bottom Fishing Report
Mineralogical Association of Canada – The Canadian Mineralogist
Mining Journal
Mining Magazine
Mining Review – Prospecting, Exploration and Mine Development
Mining Voice – The Magazine of the National Mining Association
North American Minerals News – Covering Industrial Minerals Markets of USA, Canada, Mexico and the Caribbean
North American Mining
Northern Miner – North America's Mining Newspaper
Northern Ontario Business
The Prospector

Table 4. Selected New Reference Publications Received by the MMIC Library in 1999

Title	Author	Type and Year of Publication
Canadian Mines Handbook 1999 – 2000	Giancola, D. (ed.)	Southam Mining Publications Group, Toronto, 624p., 1999
Ontario Mining & Exploration Directory 1999	Colman, R. (ed.)	Directory, Naylor Publications Company (Canada), Winnipeg Manitoba, 42p., 1999
Ontario's Living Legacy	Ministry of Natural Resources	Land Use Strategy, Queen's Printer for Ontario, Toronto, 136p., 1999
Mining Journal: 1999 Mining Sourcebook	Scales, M. (ed.)	108th Edition, Southam Magazine Group, Toronto, 146p., 1999
1999/2000 CAMESE Compendium of Canadian Mining Suppliers	Baird, J.G., Director	The Canadian Association of Mining Equipment and Services for Export, Markham Ontario, 146p., 1999
Field Geologists' Manual	Berkman, D.A. (comp.)	3rd Revised Edition, The Australasian Institute of Mining and Metallurgy, Monograph No.9, Victoria Australia, 390p., 1995

Table 4. Selected New Reference Publications Received by the MMIC Library in 1999

Title	Author	Type and Year of Publication
Urban Geology of Canadian Cities	Karrow, P.F. and White, O.L. (eds.)	GAC Special Paper 42, Geological Association of Canada, St. John's Newfoundland, 500p., 1998
Sedimentology, Stratigraphy, and Ichnology of the Lower Silurian Medina Formation in New York and Ontario	Duke, W.L. (ed.)	Guidebook, 1987 Annual Field Trip, Society of Economic Paleontologists and Mineralogists, Eastern Section, Niagara Falls Ontario, 185p., 1987
A World of Metals Finding, Making and Using Metals	Jeffery, W.G.	The International Council on Metals and the Environment, Ottawa, 41p., 1998
Bear Encounter Survival Guide	Shelton, J.G.	Pogany Productions, Hagensborg BC, 230p., 1994
Bear Attacks The Deadly Truth	Shelton, J.G.	Pogany Productions, Hagensborg BC, 273p., 1998
Executive Summary Hydrogeologic Evaluation of the Oak Ridges Moraine Area	Christie, R.M. (Chair)	Background Report No.3 to the Oak Ridges Moraine Area Planning Study, Hunter & Associates with Raven Beck Environmental Ltd., Mississauga, Ontario, 1996
Regional Stratigraphy, Structure and Exploration Models for the Porcupine Gold Camp	Kerrich, R., Dubé, B., Snyder, D. and Bleeker, W.	Course Notes and Reference Materials, Northeastern Ontario Minerals Symposium, Porcupine Prospectors and Developers Association, Timmins Ontario, 1999
Sudbury Ni-Cu-PGE deposits – South Range (A1) and North Range (B1)	Fedorowich, J. (B1) and Morrison, G. (A1) (comp.)	GAC-MAC, Field Trips A1 and B1 Guidebook, Sudbury Ontario, 44p., 1999
Transects across the Grenville Front near Sudbury, Ontario	Easton, R.M., Davidson, A. and Murphy, E.	GAC-MAC, Field Trip A2 Guidebook, Sudbury Ontario, 52p., 1999
World-class Archean vein gold deposits of the Porcupine Camp, Timmins, Ontario	Brisbin, D. and Pressacco, R. (comp.)	GAC-MAC, Field Trip A3 Guidebook, Sudbury Ontario, 98p., 1999
Tectonics of impact basin formation: The Sudbury example	Butler, H.R. and Spray, J.G.	GAC-MAG, Field Trip A4 Guidebook, Sudbury Ontario, 28p., 1999
Quaternary Geology and Geomorphology of the Sudbury Region	Bajc, A.F. and Barnett, P.J.	GAC-MAC, Field Trip A5 Guidebook, Sudbury Ontario, 68p., 1999
Environmental geology and land reclamation history of Sudbury	Bouillon, D., Heale, E. and Hall, G.	GAC-MAC, Field Trip A6 Guidebook, Sudbury Ontario, 34p., 1999
Cobalt, a historic silver mining camp	Ireland, J. and Grabowski, G.	GAC-MAC, Field Trip A8 Guidebook, Sudbury Ontario, 31p., 1999
Ordovician and Silurian fossils and strata of the Lake Timiskaming outlier	Copper, P. and Armstrong, D.K.	GAC-MAC, Field Trip B2 Guidebook, Sudbury Ontario, 31p., 1999
Late Archean rock types and controls on gold mineralization in the southern Abitibi greenstone belt of Ontario	Ayer, J., Berger, B., Johns, G., Trowell, N., Born, P. and Mueller, W.	GAC-MAC, Field Trip B3 Guidebook, Sudbury Ontario, 73p., 1999
Actualistic and nonactualistic Precambrian sedimentary styles: examples from the Proterozoic north of Lake Huron	Long, D.G.F., Young, G. M., Rainbird, R. and Fedo, C.	GAC-MAC, Field Trip B5 Guidebook, Sudbury Ontario, 50p., 1999
Overburden as a media for kimberlite, base metal and gold exploration, Wawa region, Northeastern Ontario	Morris, T.F.	GAC-MAC, Field Trip B6 Guidebook, Sudbury Ontario, 67p., 1999
Geology of the Sudbury Structure	Cosec, M.	GAC-MAC, Field Trip B7 Guidebook, Sudbury Ontario, 24p., 1999
Hydrothermal Alteration Mineral Assemblages Associated with Volcanic-Hosted Massive Sulphide Mineralization in the Noranda Area, Quebec	Santaguida, F., Gibson, H.L. and Watkinson, D. H.	GAC-MAC, Field Trip B8 Guidebook, Sudbury Ontario, 57p., 1999

Table 4. Selected New Reference Publications Received by the MMIC Library in 1999

Title	Author	Type and Year of Publication
Solidification fronts of the Sudbury melt sheet	Marsh, B.D. and Zieg, M.	GAC-MAC, Field Trip B9 Guidebook, Sudbury Ontario, 34p., 1999
Polystage convergence and extension in the mid- to lower orogenic crust: An examination of the Central Gneiss Belt, Grenville Province, along Georgian Bay	Ketchum, J.W.F., Wodicka, N.,Culshaw, N.G. and Jamieson, R. A.	GAC-MAC, Field Trip B10 Guidebook, Sudbury Ontario, 65p., 1999
Dynamic Processes in Magmatic Ore Deposits and their Application in Mineral Exploration	Keays, R.R., Lesher, C.M., Lightfoot, P.C. and Farrow, C.E.G. (eds.)	Short Course Notes Volume 13, Geological Association of Canada, Mineral Deposits Division, St. John's Newfoundland, 477p., 1999
Geophysics in Mineral Exploration: Fundamentals and Case Histories	Lowe, C., Thomas, M.D. and Morris, W.A. (eds.)	Short Course Notes Volume 14, Geological Association of Canada, Mineral deposits Division, St. John's Newfoundland, 175p., 1999
Sampling Bulk Industrial Minerals and Ores A Practical Approach	Edwards, G.H. and Harben, P.W.	Industrial Minerals Information Ltd., Surrey UK, 112p., 1999
The Geology of Pennsylvania	Shultz, C. H. (ed.)	Special Publication 1, Pennsylvania Geological Survey and Pittsburgh Geological Society, Harrisburgh PA, 888p., 1999
The Industrial Minerals HandyBook A Guide to Markets, Specifications, & Prices	Harben, P.W.	Industrial Minerals Information Ltd., Surrey UK, 296p., 1999
Ontario Geological Survey Precambrian Geoscience Section: Project Plans and Proposals 1999-2000	Fyon, A. and Thurston, P.	Sudbury, 1999
Ontario Geological Survey Sedimentary Geoscience Section: Project Plans and Proposals 1999-2000	Baker, C.	Sudbury, 1999
Latin American Mining 1999	Renski, E. (ed.)	Publication of OLAMI, Stirling Publications Limited, London UK, 80p., 1998
Mines Library Serials List 1999	Mines Library	MNDM, Mines Library, Sudbury, 1999
Mines Library Theses List 1999	Mines Library	MNDM, Mines Library, Sudbury, 1999
GAC-MAC Joint Annual Meeting		Abstract Volume 24, Laurentian University, Sudbury Ontario, 144p., 1999
Reconciliation in the Gold-Mining Industry: Problems and Practice	Wild, M.M.	Publication 29, Geology and Geophysics Department (Centre for Strategic Mineral Deposits) & UWA Extension, The University of Western Australia, 66p., 1998
Mineral Collecting in Ontario: a guide for rockhounds	Mining Lands Section, MNDM	Mining Lands Section, Ministry of Northern Development and Mines, Sudbury Ontario, 17p., 1999
Hardrock Mining on Federal Lands	National Research Council	National Academy Press, Washington DC, 247p., 1999
British Columbia Mineral Exploration Review 1998	Schroeter, T.G.	Information Circular 1999-1, Ministry of Energy and Mines, Energy and Minerals Division, Victoria BC, 18p., 1999
Platinum 1999 Interim Review	Steel, M. (ed.)	Platinum Report, Johnson Matthey, Public Limited Company, London England, 28p., 1999

Table 5. Ontario Geological Survey Publications Received by MMIC Library in 1999

Title	Author	Type and Year of Publication
Precambrian Geology, Ignace Area	Stone, D., Halle, J. and Chaloux, E.	Ontario Geological Survey, Preliminary Map P.3360, scale 1:50 000, 1999
Quaternary Geology of the Separation Lake Area, Northwestern Ontario	Morris, T.F.	Ontario Geological Survey, Open File Report 5980+, 90p., 1999
Aggregate Resources Inventory of Wellington County: Townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph	OGS and Planning & Engineering Initiatives Ltd	ARIP 162, 73p., Accompanied by four maps *ARIMs 162-1A, -2A, -1B, -2B
Aggregate Resources Inventory of the Regional Municipality of Durham: Townships of Brock, Uxbridge, Scugog; the Municipality of Clarington; the Towns of Pickering, Ajax and Whitby and the City of Oshawa	OGS and MacNaughton, Hermsen, Britton, Clarkson Planning Limited	ARIP 166, 57p.1999. Accompanied by eight maps *ARIMs 166-1A, -2A, -1B, -2B, -1C, -2C, -1D, -2D
Aggregate Resources Inventory of Prince Edward County	OGS and Jagger Hims Limited	ARIP 172, 46p., 1999.Accompanied by two maps *ARIMs 172-1, -2
Quaternary Geology, Lennan Lake Area	Morris, T.F.	Ontario Geological Survey, Map 2547, scale 1: 50 000, 1999
Quaternary Geology, Umfreville Lake Area	Morris, T.F.	Ontario Geological Survey, Map 2548, scale 1: 50 000, 1999
Precambrian Geology, Ellard Lake Area	Stone, D., Halle, J., Lange, M. and Chaloux, E.	Ontario Geological Survey, Preliminary Map P.3188, scale 1:50 000, 1999
Precambrian Geology, Pasquatchai River Area	Stone, D., Halle, J., Lange, M. and Chaloux, E.	Ontario Geological Survey, Preliminary Map P.3189, scale 1:50 000, 1999
Summary of Field Work and Other Activities 1998	Ayer, J.A., Baker, C.L., Ireland, J.C., Kelly, R.I. and Thurston, P.C. (eds.)	Ontario Geological Survey, Miscellaneous Paper 169, 285p., 1999
Precambrian Geology of the Colpitts-Bury Lakes Area (Eastern Melchett Lake Greenstone Belt)	Devaney, J.R.	Ontario Geological Survey, Open File Report 5983, 96p., 1999. Accompanied by OFM 234
Precambrian Geology of the Dayohessarah Lake Area, White River, Ontario	Stott, G.M.	Ontario Geological Survey, Open File Report 5984, 59p., 1999
Precambrian Geology, Sheraton Township	Vaillancourt, C.	Ontario Geological Survey, Preliminary Map P.3387, scale 1:20 000, 1999
Precambrian Geology, Hwy 101 West	Berger, B.R.	Ontario Geological Survey, Preliminary Map P.3388, scale 1:50 000, 1999
Precambrian geology, Shining Tree area	Johns, G.W.	Ontario Geological Survey, Preliminary Map P.3389, scale 1:30 000, 1999
Precambrian Geology, Willet-Gledhill Lakes Area, Onaman-Tashota Greenstone Belt	Stott, G.M., Straub, K.H. and Fortin, D.	Ontario Geological Survey, Preliminary Map P.3390. scale 1:30 000, 1999
Geochemical, Heavy Mineral and Pebble Lithology Data, Surficial Sampling Program, Wawa Region, Northeastern Ontario	Morris, T.F.	Ontario Geological Survey, Open File Report 5981+ 74p., 1999
Kimberlite, Base Metal and Gold Exploration Targets Based upon Heavy Mineral Data Derived from Surface Materials, Opasatika Lake Area, Northeastern Ontario	Stephenson, D.M., Morris, T.F. and Crabtree, D.C.	Ontario Geological Survey, Open File Report 5982+ 67p., 1999
Atikokan Area High Density Lake Sediment and Water Geochemical Survey, Northwestern Ontario: New Au and PGE Exploration Targets	Dyer, R.D.	Ontario Geological Survey, Open File Report 5986+ 83p., 1999

Table 5. Ontario Geological Survey Publications Received by MMIC Library in 1999

Title	Author	Type and Year of Publication
Regional Humus and Till Sampling Survey of the Eastern Part of the Shebandowan Greenstone Belt, Northwestern Ontario	Bajc, A.F.	Ontario Geological Survey, Open File Report 5993+ 92p., 1999
Aggregate Resources Inventory of Lennox and Addington County	OGS and Jagger Hims Limited	ARIP 171, 53p., 1999. Accompanied by five maps *ARIMs 171-1A, -1B, -1C, -2A, -2B
Special Project: Timmins Ore Deposit Descriptions	Pressacco, R.	Ontario Geological Survey, Open File Report 5985, 222p., 1999
Report of Activities 1998, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Blackburn, C.E., Hinz, P., Storey, C.C., Kosloski, L. and Ravnaas, C.B.	Ontario Geological Survey, Open File Report 5987, 88p., 1999
Report of Activities 1998, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North and Sioux Lookout Districts	Mason, J.K., Seim, G., White, G.D., Farrow, D., O'Brien, M.S., Walden, A. and Komar, C.	Ontario Geological Survey, Open File Report 5988, 54p., 1999
Report of Activities 1998, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schnieders, B.R., Scott, J.F., Smyk, M.C. and O'Brien, M.S.	Ontario Geological Survey, Open File Report 5989, 59p., 1999
Report of Activities 1998, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	Atkinson, B.T., Hailstone, M.H., Pressacco, R., Wilson, A.C., Draper, D.M., Hope, P., Morra, P.M. and Egerland, D.C.	Ontario Geological Survey, Open File Report 5990, 111p., 1999
Report of Activities 1998, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts	Meyer, G., Cosec, M., Grabowski, G.P.B., Guindon, D.L., Charette, M. and Gosselin, S.D.M.	Ontario Geological Survey, Open File Report 5991, 74p., 1999
Report of Activities 1998, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeast and Southwest Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Stewart, J.M. and Carter, T.R.	Ontario Geological Survey, Open File Report 5992, 76p., 1999
Ontario Mineral and Exploration Statistics / Statistiques de l'Ontario sur les minéraux et l'exploration	Compiled by staff of Information Services Section	Ontario Mineral and Exploration Statistics 1998, Ontario Ministry of Northern Development and Mines, 88p., 1999
Geology of Murphy and Wark Townships, District of Cochrane	Berger, B.R.	Ontario Geological Survey, Open File Report 5994, 64p., 1999. Accompanied by map P.3305 – Revised
The Geology of Zinc-Rich Sulphide Mineralization in Metasedimentary Subprovinces: Examples from the Pontiac and Quetico Subprovinces, Northeastern Ontario	Parker, J.R.	Ontario Geological Survey, Open File Report 5996, 67p., 1999. Accompanied by map P.3247 – Revised
Precambrian Geology, Murphy and Wark Townships	Berger, B.R.	Ontario Geological Survey, Preliminary Map P.3305-Revised, scale 1:20 000, 1999
Geological Compilation, Brower, Duff, Fournier, Hanna, Lamarche, Little, Mann, McCart, Newmarket, Rheaume, St. John and Tully Townships	Barrie, C.T.	Ontario Geological Survey, Preliminary Map P.3391, scale 1:50 000, 1999
Geological Compilation, Bowyer, Coulson, Galna, Kerrs, Knox, Marathon, Milligan, Moody, Purvis, Steele and Warden Townships	Barrie, C.T.	Ontario Geological Survey, Preliminary Map P.3392, scale 1:50 000, 1999
Geological Compilation, Fox, Stimson, Pyne, Mortimer, Sherring, Aurora, Edwards, Wesley, Calvert, Terry and Rickard Townships	Barrie, C.T.	Ontario Geological Survey, Preliminary Map P.3393, scale 1:50 000, 1999

Table 5. Ontario Geological Survey Publications Received by MMIC Library in 1999

Title	Author	Type and Year of Publication
Geological Compilation, Dundonald and Clergue Townships	Barrie, C.T.	Ontario Geological Survey, Preliminary Map P.3394, scale 1:20 000, 1999
Geological Compilation, Beatty and Munro Townships	Barrie, C.T.	Ontario Geological Survey, Preliminary Map P.3395, scale 1:20 000, 1999
Geological Compilation of the Lake Abitibi Area, Abitibi Greenstone Belt	Ayer, J.A., Berger, B.R. and Trowell, N.F.	Ontario Geological Survey, Preliminary Map P.3398, scale 1:100 000, 1999
Quaternary Geology of the Newmarket Area	Barnett, P.J., Dodge, J.E.P., McCrae, M.K. and Stuart, A.	Ontario Geological Survey, Map 2562, scale 1:50 000, 1999
Precambrian Geology, Medicine Stone Lake Area	Atkinson, B.T.	Ontario Geological Survey, Preliminary Map P.3397, scale 1:50 000, 1999
The Mafic-Ultramafic Intrusions of the Atikokan-Quetico Area, Northwestern Ontario	MacTavish, A.D.	Ontario Geological Survey, Open File Report 5997, 154p., 1999. Accompanied by eight black and white, back-pocket figures
Mineral Potential of Proterozoic Keweenawan Intrusions: Implications of Major and Trace Element Geochemical Data from Bimodal Mafic and Felsic Volcanic Sequences of Mamainse Point and the Black Bay Peninsula, Ontario	Lightfoot, P.C., Sage, R.P., Doherty, W., Naldrett, A.J. and Sutcliffe, R.H.	Ontario Geological Survey, Open File Report 5998, 91p., 1999
Surficial Geology of the Regional Municipality of Sudbury	Barnett, P.J. and Bajc, A.F.	Ontario Geological Survey, Preliminary Map P.3399, scale 1:100 000, 1999
Precambrian Geology, Entwine Lake Area	Stone, D. and Halle, J.	Ontario Geological Survey, Preliminary Map P.3400, scale 1:50 000, 1999
Results of Paleozoic Bedrock Drilling Project, Northern Lake Simcoe Area, South-Central Ontario	Armstrong, D.K.	Ontario Geological Survey, Open File Report 5999+, 125p., 1999
Gold Grains in Till, Western Shebandowan Greenstone Belt, Northwestern Ontario	Bajc, A.F.	Ontario Geological Survey, Preliminary Map P.3417, scale 1:100 000, 1999
Aggregate Resources Inventory of the Highway 17 Corridor between the Wahnapitae Area and Sturgeon Falls	Rowell, D.J.	ARIP 174, 64p., 1999. Accompanied by one map *ARIM 174
Summary of Field Work and Other Activities 1999	Ayer, J.A., Baker, C.L., Kelly, R.I., Stott, G.M. and Thurston, P.C. (eds.)	Ontario Geological Survey, Open File Report 6000, 432p., 1999

* *Also released in digital form.*

\+ *Geochemical data / chemical analyses / appendices available in digital form.*

Table 6. Geological Survey of Canada Publications Incorporated into the MMIC Library during 1999.

Title	Author	Type and Year of Publication
Till geochemical signatures associated with gold deposits in the Timmins-Matheson area, Western Abitibi greenstone belt, Northeastern Ontario	McClenaghan, M.B.	Open File 3707, 90p., 1999
Mineralogy and geochemistry of the C14 kimberlite and associated glacial sediments, Kirkland Lake, Ontario	McClenaghan, M.B., Kjarsgaard, I.M., Stirling, J.A.R., Pringle, G. Kjarsgaard, B.A. and Berger, B.	Open File 3719, 147p., 1999. Accompanied by one diskette
Upper Ordovician strata of Southwestern Ontario: synthesis of literature and concepts	Hamblin, A.P.	Open File 3729, 33p., 1999
Geology, Swayze greenstone belt, Ontario	Heather, K.B. and Shore, G.T.	Open File 3384a, two sheets, 1999

Table 6. Geological Survey of Canada Publications Incorporated into the MMIC Library during 1999.

Title	Author	Type and Year of Publication
Geology, Rollo Lake, Swayze greenstone belt, Ontario (NTS/SNRC 41 O/15)	Heather, K.B. and Shore, G.T.	Open File 3384b, scale 1:50 000, 1999
Geology, Rush Lake, Swayze greenstone belt, Ontario (NTS/SNRC 41 O/16)	Heather, K.B. and Shore, G.T.	Open File 3384c, scale 1:50 000, 1999
Geology, Mattagami Lake, Swayze greenstone belt, Ontario (NTS/SNRC 41 P/13, west half/moitié ouest)	Heather, K.B. and Shore, G.T.	Open File 3384d, scale 1:50 000, 1999
Geology, Sultan, Swayze greenstone belt, Ontario (NTS/SNRC 41 O/10)	Heather, K.B. and Shore, G.T.	Open File 3384e, scale 1:50 000, 1999
Geology, Opeepeesway Lake, Swayze greenstone belt, Ontario (NTS/SNRC 41 O/9)	Heather, K.B. and Shore, G.T.	Open File 3384f, scale 1:50 000, 1999
Geology, Gogama, Swayze greenstone belt, Ontario (NTS/SNRC 41 P/12, west half/moitié ouest)	Heather, K.B. and Shore, G.T.	Open File 3384g, scale 1:50 000, 1999
Geology, Biscotasing, Swayze greenstone belt, Ontario (NTS/SNRC 41 O/8)	Heather, K.B. and Shore, G.T.	Open File 3384h, scale 1:50 000, 1999
Geology, Westree, Swayze greenstone belt, Ontario (NTS/SNRC 41 P/5, west half/moitié ouest)	Heather, K.B. and Shore, G.T.	Open File 3384I, scale 1:50 000, 1999
Geology, Sturgeon Lake-Obonga Lake area, Ontario (NTS parts of /SNRC parties de 52 G, H, I, J)	Percival, J.A., Castonguay, S., Whalen, J.B., Brown, J.L., McNicoll, V. and Harris, J.R.	Open File 3738, scale 1:100 000, 1999
A Landsat thematic mapper mosaic of the Oak Ridges Moraine and the Greater Toronto area of southern Ontario (parts of NTS 30 M; 31 C, D; 40 P)	Kenny, F.M.	Open File 3646, one poster, 1999
Indicator mineral and till geochemical reconnaissance of the Red Lake/Confederation Lake area, District of Red Lake, Northwestern Ontario: raw data with preliminary interpretation	Sharpe, D.R. and Russell, H.A.J.	Open File 3038, 178p., 1999. Accompanied by one diskette
Lower Silurian Medina Group of Southwestern Ontario: summary of literature and concepts	Hamblin, A.P.	Open File 3468, 32p., 1999
Geology, south Sturgeon Lake area, Ontario (parts of NTS 52 G/14, 15)	Morton, R.L., Hudak, G. and Franklin, J.M.	Open File 3642, scale 1:15 000, 1999
Mineralogy and geochemistry of the A4 kimberlite and associated glacial sediments, Kirkland Lake, Ontario	McClenaghan, M.B., Kjarsgaard, I.M., Kjarsgaard, B.A., Stirling, J.A.R., Pringle, G. and Berger, B.	Open File 3769, 162p., 1999. Accompanied by one diskette
Mineralogy and geochemistry of the Peddie kimberlite and associated glacial sediments, Lake Timiskaming, Ontario	McClenaghan, M.B., Kjarsgaard, B.A., Kjarsgaard, I.M., Paulen, R.C. and Stirling, J.A.R.	Open File 3775, 190p., 1999. Accompanied by one diskette
Geochronological compilation of the Superior Province, Manitoba, Ontario, Quebec	Skulski, T. and Villeneuve, M.	Open File D3715, one diskette, 1999
Digital elevation model, Greater Toronto Area, southern Ontario, and Lake Ontario Bathymetry	Kenny, F.M., Paquette, J., Russell, H.A.J., Moore, A. and Hinton, M.J.	Open File D3678, 1 CD-ROM, 1999
Surficial geology of the Red Lake-Confederation Lake area, Ontario	Russell, H.A.J., Sharpe, D.R. and Stacey, P.	Open File D3744, scale 1:100 000, 1 CD-ROM, 1999
A compilation of OGS, GSC and industry geoscience data over the Swayze greenstone belt, Ontario	Harris, J. and Wilkinson, L.	Open File D3770, 1 CD-ROM, 1999
Selected posters summarizing research results from the Swayze greenstone belt, Ontario	Harris, J., Wilkinson, L. and Vanderkam, R.	Open File D3771, 1 CD-ROM, 1999

Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Southern Ontario Regional Resident Geologist (Petroleum Resources Centre)–1999

by

T.R. Carter

2000

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OIL AND GAS EXPLORATION AND DEVELOPMENT ACTIVITY IN ONTARIO IN 1999

T.R. Carter

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INTRODUCTION

Oil and gas drilling activity in Ontario in 1999 returned to the depressed levels experienced in 1997 with drilling reported to be complete at only 65 wells, compared to 104 wells in 1998 and 73 in 1997. Low world prices for crude oil at the beginning of the year are believed to be the cause.

EXPLORATION ACTIVITY

A total of 112 licences to drill and operate new wells were issued by the Ministry of Natural Resources in 1999, compared to 117 in 1998. At the time of writing drilling has reportedly been completed at 65 wells in 1999, 25 of which were exploratory wells, 26 development wells, and 14 in other classes ("service"). The 1999 exploratory drilling resulted in 4 wells being reported as gas producers and 2 wells being reported as oil producers (Table 1). The drill testing of an additional 7 wells that encountered hydrocarbons were undergoing evaluation at the time of writing. Development drilling resulted in 11 wells reported to be oil producers and 9 as gas producers, with 3 wells undergoing evaluation.

Drilling was reportedly completed at 4 exploratory wells and 9 development wells designed to test targets in strata of Ordovician age. None of the exploratory wells reported success, however, all of the development wells were successful, resulting in the development of 8 new oil producers and 1 new natural gas well. All of these successful new wells are horizontal wells. New oil wells were completed in the following pools; Mersea 3-6-V, Mersea 3-4-IV, Romney 3-8-II, and Gosfield North 2-21-VI. The new natural gas well represents a successful extension of a previous discovery of natural gas related to the Innerkip gas pool within Ordovician carbonates above the Cambrian sandstones.

There were 5 exploratory wells and 3 development wells completed to test targets within Cambrian strata in 1999. Three of the exploratory wells were completed as gas producers in extensions of the Innerkip pool; Cambright #80, Blenheim 3-10-VI, Cambright #75, Blenheim 2-23-XII, and Cambright #74, Blenheim 8-19-XI. Two of the development wells were also completed as gas wells within the Innerkip gas pool.

There were 14 exploratory wells completed to test targets within the Silurian Guelph-Salina formations in 1999, two of which were successful. The Range No.5 (Dev.#1) Enniskillen 8-27-XI well was completed as an oil producer and the Petrofind Enniskillen 3-1-II well was completed as a gas producer in new pool discoveries. Six of the 14 wells were still undergoing evaluation at the time of writing. During 1999, 6 development wells were also completed to test targets within the Silurian Guelph-Salina formations. The CanEnerco #8 (Horiz. #1) Sarnia 2-11-VIII well is reported to be a potential gas producer in the Sarnia 2-11-VIII gas pool. The Clearbeach #4 Aldborough 7-Z-I well was completed as a gas producer in the Townline gas pool. The Clearwood Chatham 2-23-VII well was reported as a successful gas well in the Chatham C pool. The Talisman (Horiz. #1) Mersea 2-16-I well was completed as a suspended gas well in the Mersea 1-16-I gas pool, and the Range No.5 (Dev.#1)(Horiz. #1) Enniskillen 8-27-XI well is reported to be an oil producer in the Enniskillen 8-27-XI oil pool.

One exploratory and 5 development wells were completed to test Lower Silurian sandstone targets in 1999. The exploratory well was unsuccessful. Greentree Gas and Oil completed the 5 development wells as gas producers within the South Walsingham 5-6-VI gas pool that was discovered in 1998.

Greentree Gas & Oil completed 1 exploratory and 3 development wells to test targets within Devonian strata in 1999. The exploratory well resulted in a new pool discovery south of the Rodney oil pool. Two of 3 development wells were completed as oil producers in the new pool.

Fourteen wells in other classes were drilled during 1999. Union Gas Limited drilled 4 stratigraphic test wells, 1 in the Sarnia 5-3-II (Bluewater) pool, 2 in the Mandaumin pool and 1 in the Oil City pool to collect geological information concerning the suitability for conversion to natural gas storage. Union Gas Limited developed the Dawn 1-27-VI (Bentpath East) gas pool for conversion to natural gas storage in 1999 by drilling 3 natural gas storage wells and one observation well. The company also drilled a natural gas storage well in the Dawn 7-28-V (Booth Creek) pool. Enbridge Consumers Energy Inc. drilled 3 natural gas storage wells in the newly designated Ladysmith natural gas storage pool. General Chemical completed one salt solution mining well in 1999 on their solution-mining site in the Amherstburg area.

Preliminary figures indicate that Ontario produced 239 915 cubic m of crude oil (1.5 million barrels) in 1999 valued at $44 million. This represents a 9% volume increase from the previous year and nearly a 50% increase in value. 1998 production totalled 219 328 cubic m of crude oil valued at $29.8 million.

Data on Ontario's natural gas production during 1999 was not available at the time of writing.

RECOMMENDATIONS FOR EXPLORATION

Ordovician strata is still the focus of exploration directed at the discovery of new oil reservoirs in southwest Ontario, with Essex County and southern Kent County being the most favourable areas for exploration. Most of southwest Ontario is underlain by Ordovician carbonates that may be considered as prospective hosts for reservoirs of this type. Most of the area is essentially untested. Exploration activity geared to testing targets within this environment was greatly reduced in 1999 due to the dramatic decline in the world price of oil at the end of 1998.

Untested parts of Lake Erie also remain as a potential target area. The western part of the lake is prospective for reservoirs within Silurian Guelph Formation reefs, while the eastern part of the lake is underlain by gas-bearing Lower Silurian sandstones that extend into the onshore portions of Haldimand, Norfolk, and Welland counties. Greentree Gas & Oil discovered a new gas pool in Norfolk County in 1998.

There is also considerable potential for the discovery of gas and/or oil pools along the thinning edge of the Cambrian sandstone in the subsurface, or within fault-controlled structures. With the exception of the Innerkip gas pool there has been little effort directed at exploring for new pools within this environment.

Silurian pinnacle reefs still are an attractive target for oil and/or gas exploration and attracted renewed interest in 1999. Lambton County has historically been the most prospective area for exploration within this environment. Discoveries in this area have potential for conversion to natural gas storage due to their proximity to natural gas pipelines and existing storage pools. A considerable amount of 3D seismic acquisition is underway in Lambton County and Huron County in an attempt to locate any remaining, undiscovered reefs.

Greentree Gas & Oil proved there is still remaining potential within Devonian-age strata in the Rodney area with a discovery of a new oil pool in 1999. The core area in Lambton County for this type of exploration target has been fully developed.

Table 1. Successful Exploratory Wells Completed in Southwest Ontario in 1999 (See Figure 1 for Well Locations)

Map No.	Latitude	Longitude	Well Name	Target	Depth (m.)	Class	Results	Completion Date
1	42-52-49	82-02-03	Range No.5(Dev.#1) Enniskillen 8-27-XI	SAL	715	NPW	OP	1999/01/12
2	42-46-58	82-14-15	Petrofind Enniskillen 3-1-II	SAL	625	NPW	GP	1999/02/17
3	42-32-39	81-43-24	GGOL #13 Aldborough 3-4-D-VII	DEV	132	NPW	OP	1999/09/28
4	43-14-05	80-32-02	Cambright #80 Blenheim 3-10-VI	CAM	863	NPW	GP	1999/09/27
5	43-17-40	80-39-26	Cambright #75 Blenheim 2-23-XII	CAM	872	NPW	GP	1999/07/16
6	43-16-52	80-37-04	Cambright #74 Blenheim 8-19-XI	CAM	860	NPW	GP	1999/10/26

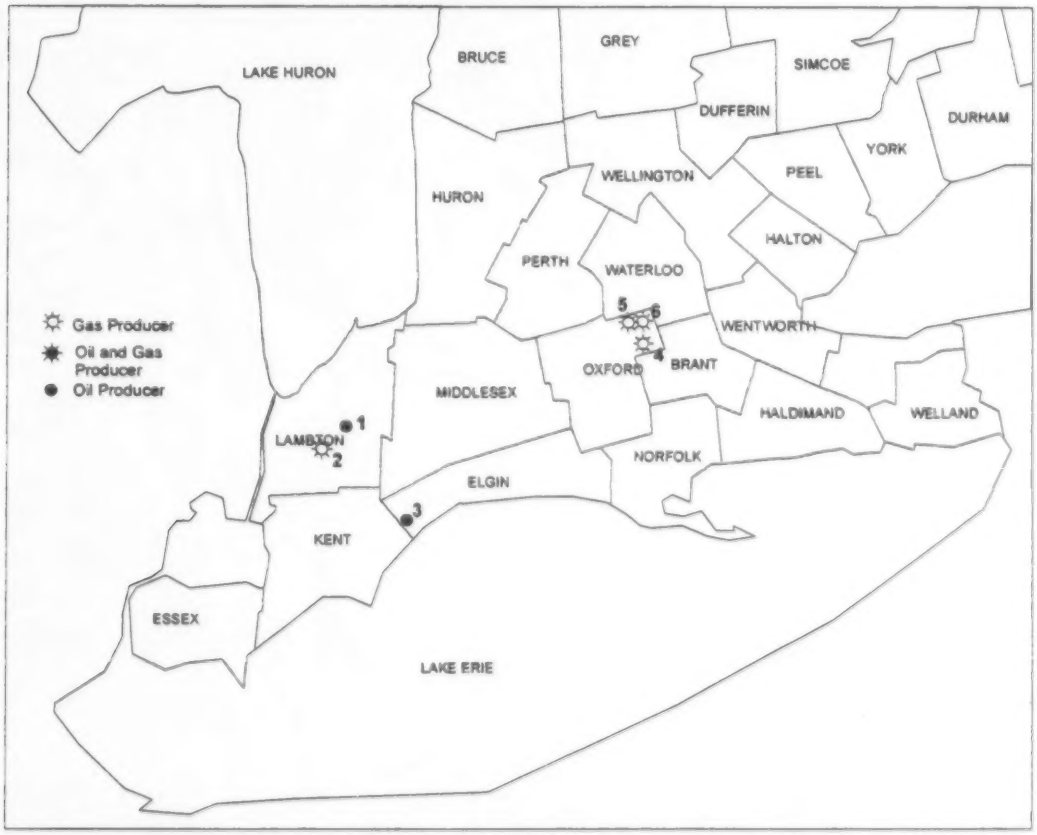

Figure 1. Successful Exploratory Wells Completed in Ontario in 1999.

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.